''*Use.*'' (General Technology Note)—Operation, installation (including on-site installation), maintenance (checking), repair, overhaul and refurbishing.

''*User-accessible programmability.*'' (Cat 4, 5, and 6)—The facility allowing a user to insert, modify, or replace ''programs'' by means other than:

(a) A physical change in wiring or interconnections; or

(b) The setting of function controls including entry of parameters.

Utilization facility. (a) As defined by 10 CFR 110.2 of the Nuclear Regulatory Commission Regulations, utilization facility means a nuclear reactor, other than one that is a production facility, any of the following major components of a nuclear reactor: Pressure vessels designed to contain the core of a nuclear reactor, other than one that is a production facility, and the following major components of a nuclear reactor:

(1) Primary coolant pumps;

(2) Fuel charging or discharging machines; and

(3) Control rods.

(b) Utilization facility does not include the steam turbine generator portion of a nuclear power plant.

''*Vacuum Atomization.*'' (Cat 1)—A process to reduce a molten stream of metal to droplets of a diameter of 500 micrometer or less by the rapid evolution of a dissolved gas upon exposure to a vacuum.

''*Variable geometry airfoils.*'' (Cat 7)—Use trailing edge flaps or tabs, or leading edge slats or pivoted nose droop, the position of which can be controlled in flight.

''*Vector Rate.*'' (Cat 4)—See: ''Two dimensional Vector Rate''; ''Three dimensional Vector Rate''.

You. Any person, including a natural person, including a citizen of the United States or any foreign country; any firm; any government, government agency, government department, or government commission; any labor union; any fraternal or social organization; and any other association or organization whether or not organized for profit.

[61 FR 12925, Mar. 25, 1996, as amended at 61 FR 68586, Dec. 30, 1996; 62 FR 6686, Feb. 12, 1997; 62 FR 25470, May 9, 1997; 63 FR 50525, Sept. 22, 1998; 63 FR 72166, Dec. 31, 1998]

PART 774—THE COMMERCE CONTROL LIST

Sec.

AUTHORITY: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; 10 U.S.C. 720; 10 U.S.C. 7430(e); 18 U.S.C. 2510 *et seq.*; 22 U.S.C. 287c; 22 U.S.C. 3201 *et seq.*; 22 U.S.C. 6004; Sec. 201, Pub. L. 104–58, 109 Stat. 557 (30 U.S.C. 185(s)); 30 U.S.C. 185(u); 42 U.S.C. 2139a; 42 U.S.C. 6212; 43 U.S.C. 1354; 46 U.S.C. app. 466c; 50 U.S.C. app. 5; E.O. 12924, 59 FR 43437, 3 CFR, 1994 Comp., p. 917; Notice of August 15, 1995, 3 CFR, 1995 Comp., p. 501; Notice of August 14, 1996, 3 CFR, 1996 Comp., p. 298; Notice of August 13, 1997 (62 FR 43629, August 15, 1997); Notice of August 13, 1998 (63 FR 44121, August 17, 1998).

SOURCE: 61 FR 12937, Mar. 25, 1996, unless otherwise noted.

§ 774.1 Introduction.

In this part, references to the EAR are references to 15 CFR chapter VII, subchapter C. The Bureau of Export Administration (BXA) maintains the Commerce Control List (CCL) that includes items (commodities, software, and technology) subject to the authority of BXA. The CCL does not include those items exclusively controlled for export by another department or agency of the U.S. Government. In instances where other agencies administer controls over related items, entries in the CCL will contain a reference to these controls. Those items subject to the EAR but not specified on the CCL are identified by the designator ''EAR99''. See §734.2(a) of the EAR for items that are ''subject to the EAR''. You should consult part 738 of the EAR for an explanation of the organization of the CCL and its relationship to the Country Chart.

The CCL is contained in Supplement No. 1 to this part, and Supplement No. 2 to this part contains the General Technology and Software Notes relevant to entries contained in the CCL.

§ 774.2 [Reserved]

SUPPLEMENT NO. 1 TO PART 774—THE COMMERCE CONTROL LIST

CATEGORY 0—NUCLEAR MATERIALS, FACILITIES, AND EQUIPMENT [AND MISCELLANEOUS ITEMS]

A. SYSTEMS, EQUIPMENT AND COMPONENTS

0A001 "Nuclear reactors", i.e., reactors capable of operation so as to maintain a controlled, self-sustaining fission chain reaction, and equipment and components specially designed or prepared for use in connection with a "nuclear reactor", including (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:

Control(s): Items described in 0A001 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A.
Related Controls: N/A
Related Definitions: N/A
Items: a. Pressure vessels, i.e. metal vessels as complete units or X parts therefor, which are specially designed or prepared to contain the core of a ''nuclear reactor'' and are capable of withstanding the operating pressure of the primary coolant, including the top plate for a reactor pressure vessel;

b. Fuel element handling equipment, including reactor fuel charging and discharging machines;

c. Control rods specially designed or prepared for the control of the reaction rate in a ''nuclear reactor'', including the neutron absorbing part and the support or suspension structures therefore, and control rod guide tubes;

d. Electronic controls for controlling the power levels in ''nuclear reactors'', including reactor control rod drive mechanisms and radiation detection and measuring instruments to determine neutron flux levels;

e. Pressure tubes specially designed or prepared to contain fuel elements and the primary coolant in a ''nuclear reactor'' at an operating pressure in excess of 5.1 MPa;

f. Tubes or assemblies of tubes, made from zirconium metal or alloy in which the ratio of hafnium to zirconium is less than 1:500 parts by weight, specially designed or prepared for use in a ''nuclear reactor'';

g. Coolant pumps specially designed or prepared for circulating the primary coolant of ''nuclear reactors'';

h. Internal components specially designed or prepared for the operation of a ''nuclear reactor'', including core support structures, thermal shields, baffles, core grid plates and diffuser plates;

i. Heat exchangers.

0A002 Power generating or propulsion equipment specially designed for use with space, marine or mobile "nuclear reactors". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

0A018 Items on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $1,500, except $0 for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: 0A018.a, .b, and .c in $ value; 0A018.d, .e, and .f in number.
Related Controls: N/A
Related Definitions: N/A
Items: a. Power controlled searchlights and control units therefor, designed for military use, and equipment mounting such units; and specially designed parts and accessories therefor;

b. Construction equipment built to military specifications, specially designed for airborne transport; and specially designed parts and accessories therefor;

c. Specially designed components and parts for ammunition, except cartridge cases, powder bags, bullets, jackets, cores, shells, projectiles, boosters, fuses and components, primers, and other detonating devices and ammunition belting and linking machines (all of which are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR parts 120 through 130.)

d. Bayonets;

e. Muzzle-loading (black powder) firearms;

NOTE: Antique small arms dating prior to 1890 and their reproductions are not controlled by this ECCN 0A018.

f. Military helmets, except:

f.1. Conventional steel helmets other than those described by 0A018.f.2 of this entry.

f.2. Helmets, made of any material, equipped with communications hardware, optional sights, slewing devices or mechanisms to protect against thermal flash or lasers.

NOTE: Helmets described in 0A018.f.1 are controlled by 0A988. Helmets described in 0A018.f.2 are controlled by the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category X).

0A980 Horses by sea.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

0A982 Saps; thumbcuffs, leg irons, shackles, and handcuffs; straight jackets, plastic handcuffs, conventional steel military helmets, police helmets and shields; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

0A983 Specially designed implements of torture and thumbscrews; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s): CC applies to entire entry. A license is required for ALL destinations, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information.)

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

0A984 Shotguns, barrel length 18 inches (45.72 cm) inches or over; buckshot shotgun shells; except equipment used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and parts, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to shotguns with a barrel length over 18 in. (45.72 cm) but less than 24 in. (60.96 cm) or buckshot shotgun shells controlled by this entry, regardless of end-user.	CC Column 1.
CC applies to shotguns with a barrel length greater than or equal to 24 in. (60.96 cm), regardless of end-user.	CC Column 2.
CC applies to shotguns with a barrel length greater than or equal to 24 in. (60.96 cm) if for sale or resale to police or law enforcement.	CC Column 3.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: This entry does not control shotguns with a barrel length of less than 18 inches (45.72 cm). (See 22 CFR part 121.) These items are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

0A985 Optical sighting devices for firearms (including shotguns controlled by 0A984); discharge type arms (for example, stun guns, shock batons, electric cattle prods, immobilization guns and projectiles, etc.)

except equipment used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and parts, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

0A986 Shotgun shells, except buckshot shotgun shells, and parts.

LICENSE REQUIREMENTS

Reason for Control: UN
UN applies to entire entry. A license is required for items controlled by this entry to Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro). The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

0A988 Conventional military steel helmets as described by 0A018.f.1; and machetes.

LICENSE REQUIREMENTS

Reason for Control: UN
Control(s): UN applies to entire entry. A license is required for conventional military steel helmets as described by 0A018.f.1 to Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro). A license is required for machetes to Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to *Iran* must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

0A989 Water cannon and specially designed components for water cannon.

LICENSE REQUIREMENTS

Reason for Control: UN
Control(s): UN applies to entire entry. A license is required for items controlled by this entry to the Federal Republic of Yugoslavia (Serbia and Montenegro). The Commerce Country Chart is not designed to determine licensing requirements for this entry. See §746.9 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

0B001 Plant for the separation of isotopes of "natural uranium" and "depleted uranium", "special fissile materials" and "other fissile materials", and specially designed or prepared equipment and components therefor, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0B001 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

LICENSE EXCEPTIONS,

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A
Related Definitions: N/A
Items: a. Plant specially designed for separating isotopes of ''natural uranium'' and ''depleted uranium'', ''special fissile materials'' and ''other fissile materials'', as follows:

a.1. Gaseous diffusion separation plant;

a.2. Gas centrifuge separation plant;

a.3. Aerodynamic separation plant;

a.4. Chemical exchange separation plant;

a.5. Ion-exchange separation plant;

a.6. Atomic vapor ''laser'' isotopic separation plant;

a.7. Molecular ''laser'' isotopic separation plant;

a.8. Plasma separation plant;

a.9. Electro magnetic separation plant;

b. Equipment and components, specially designed or prepared for gaseous diffusion separation process, as follows:

b.1. Bellow valves made of or protected by materials resistant to UF_6 (e.g., aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel), with a diameter of 40 mm to 1500 mm;

b.2.a. Compressors (positive displacement, centrifugal and axial flowtypes) or gas blowers with a suction volume capacity of 1 m^3/min or more of UF_6, and discharge pressure up to 666.7 kPa, made of or protected by materials resistant to UF_6 (e.g. aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel);

b.2.b. Rotary shaft seals for compressors or blowers specified in 0B001.b.2.a. and designed for a buffer gas in-leakage rate of less than 1,000 cm^3/min.;

b.3. Gaseous diffusion barriers made of porous metallic, polymer or ceramic materials resistant to corrosion by UF_6 with a pore size of 10 to 100 nm, a thickness of 5 mm or less, and, for tubular forms, a diameter of 25 mm or less;

b.4. Gaseous diffuser housings made of or protected by materials resistant to corrosion by UF_6;

b.5. Heat exchangers made of aluminum, copper, nickel, or alloys containing more than 60 weight percent nickel, or combinations of these metals as clad tubes, designed to operate at sub-atmospheric pressure with a leak rate that limits the pressure rise to less than 10 Pa per hour under a pressure differential of 100 kPa;

c. Equipment and components, specially designed or prepared for gas centrifuge separation process, as follows:

c.1. Gas centrifuges;

c.2. Complete rotor assemblies consisting of one or more rotor tube cylinders;

c.3. Rotor tube cylinders with a thickness of 12 mm or less, a diameter of between 75 mm and 400 mm, made from any of the following high strength-to-density ratio materials:

c.3.a. Maraging steel capable of an ultimate tensile strength of 2,050 MPa or more;

c.3.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more; *or*

c.3.c. ''Fibrous or filamentary materials'' with a ''specific modulus'' of more than 3.18×10^6 m and a ''specific tensile strength'' greater than 76.2×10^3 m;

c.4. Magnetic suspension bearings consisting of an annular magnet suspended within a housing made of UF_6 resistant materials (e.g. aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel) containing a damping medium and having the magnet coupling with a pole piece or second magnet fitted to the top cap of the rotor;

c.5. Specially prepared bearings comprising a pivot-cup assembly mounted on a damper;

c.6. Rings or bellows with a wall thickness of 3 mm or less and a diameter of between 75 mm and 400 mm and designed to give local support to a rotor tube or to join a number together, made from any of the following high strength-to-density ratio materials;

c.6.a. Maraging steel capable of an ultimate tensile strength of 2050 MPa or more;

c.6.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more; *or*

c.6.c. ''Fibrous or filamentary materials'' with a ''specific modulus'' of more than 3.18×10^6 m and a ''specific tensile strength'' greater than 76.2×10^3 m;''.

c.7. Baffles of between 75 mm and 400 mm diameter for mounting inside a rotor tube, made from any of the following high strength-to-density ratio materials:

c.7.a. Maraging steel capable of an ultimate tensile strength of 2050 MPa or more;

c.7.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more; *or*

c.7.c. ''Fibrous or filamentary materials'' with a ''specific modulus'' of more than 3.18×10^6 m and a ''specific tensile strength'' greater than 76.2×10^3 m;''.

c.8. Top and bottom caps of between 75 mm and 400 mm diameter to fit the ends of a rotor tube, made from any of the following high strength-to-density ratio materials:

c.8.a. Maraging steel capable of an ultimate tensile strength of 2050 MPa or more; *or*

c.8.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more;

c.8.c. ''Fibrous or filamentary materials'' with a ''specific modulus'' of more than 3.18×10^6 m and a ''specific tensile strength'' greater than 76.2×10^3 m.

c.9. Molecular pumps comprised of cylinders having internally machined or extruded helical grooves and internally machined bores;

c.10. Ring-shaped motor stators for multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600 to 2,000 Hz and a power range of 50 to 1,000 Volt-Amps;

c.11. Frequency changers (converters or inverters) specially designed or prepared to

supply motor stators for gas centrifuge enrichment, having all of the following characteristics, and specially designed components therefor:

c.11.a. Multiphase output of 600 to 2000 Hz;

c.11.b. Frequency control better than 0.1%;

c.11.c. Harmonic distortion of less than 2%; *and*

c.11.d. An efficiency greater than 80%;

c.12. Centrifuge housing/recipients to contain the rotor tube assembly of a gas centrifuge, consisting of a rigid cylinder of wall thickness up to 30 mm with precision machined ends and made of or protected by UF_6 resistant materials;

c.13. Scoops consisting of tubes of up to 12 mm internal diameter for the extraction of UF_6 gas from within a centrifuge rotor tube by a Pitot tube action, made of or protected by UF_6 resistant materials;

d. Equipment and components, specially designed or prepared for aerodynamic separation process, as follows:

d.1. Separation nozzles consisting of slit-shaped, curved channels having a radius of curvature less than 1 mm and having a knife-edge contained within the nozzle which separates the gas flowing through the nozzle into two streams;

d.2. Tangential inlet flow-driven cylindrical or conical tubes (vortex tubes), made of or protected by UF_6 resistant materials with a diameter of between 0.5 cm and 4 cm and a length to diameter ratio of 20:1 or less and with one or more tangential inlets;

d.3. Compressors (positive displacement, centrifugal and axial flow types) or gas blowers with a suction volume capacity of 2 m^3/min, made of or protected by materials resistant to UF_6 (e.g., aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel), and rotary shaft seals therefor;

d.4. Aerodynamic separation element housings, made of or protected by materials resistant to UF_6 to contain vortex tubes or separation nozzles;

d.5. Heat exchangers made of aluminum, copper, nickel, or alloy containing more than 60 weight percent nickel, or combinations of these metals as clad tubes, designed to operate at pressures of 600 kPa or less;

d.6. Bellows valves made of or protected by UF_6 resistant materials with a diameter of 40 to 1500 mm;

d.7. Process systems for separating UF_6 from carrier gas (hydrogen or helium) to 1 ppm UF_6 content or less, including:

d.7.a. Cryogenic heat exchangers and cryoseparators capable of temperatures of $-120°$ C or less;

d.7.b. Cryogenic refrigeration units capable of temperatures of $-120°$ C or less;

d.7.c. Separation nozzle or vortex tube units for the separation of UF_6 from carrier gas;

d.7.d. UF_6 cold traps capable of temperatures of $-20°$ C or less;

e. Equipment and components, specially designed or prepared for chemical exchange separation process, as follows:

e.1. Fast-exchange liquid-liquid centrifugal contactors with stage residence time of 30 seconds or less and resistant to concentrated hydrochloric acid (e.g., made of or lined with suitable plastic materials such as fluorocarbon polymers or lined with glass);

e.2. Fast-exchange liquid-liquid pulse columns with stage residence time of 30 seconds or less and resistant to concentrated hydrochloric acid (e.g., made of or lined with suitable plastic materials such as fluorocarbon polymers or lined with glass);

e.3. Electrochemical reduction cells designed to reduce uranium from one valence state to another;

e.4. Electrochemical reduction cells feed equipment to take U^{+4} from the organic stream and, for those parts in contact with the process stream, made of or protected by suitable materials (e.g., glass, fluorocarbon polymers, polyphenyl sulphate, polyether sulfone and resin-impregnated graphite);

e.5. Feed preparation systems for producing high purity uranium chloride solution consisting of dissolution, solvent extraction and/or ion exchange equipment for purification and electrolytic cells for reducing the uranium U^{+6} or U^{+4} to U^{+3};

e.6. Uranium oxidation systems for oxidation of U^{+3} to U^{+4};

f. Equipment and components, specially designed or prepared for ion-exchange separation process, as follows:

f.1. Fast reacting ion-exchange resins, pellicular or porous macro-reticulated resins in which the active chemical exchange groups are limited to a coating on the surface of an inactive porous support structure, and other composite structures in any suitable form, including particles or fibers, with diameters of 0.2 mm or less, resistant to concentrated hydrochloric acid and designed to have an exchange rate half-time of less than 10 seconds and capable of operating at temperatures in the range of 100° C to 200° C;

f.2. Ion exchange columns (cylindrical) with a diameter greater than 1000 mm, made of or protected by materials resistant to concentrated hydrochloric acid (e.g., titanium or fluorocarbon plastics) and capable of operating at temperatures in the range of 100° C to 200° C and pressures above 0.7 MPa;

f.3. Ion exchange reflux systems (chemical or electrochemical oxidation or reduction systems) for regeneration of the chemical reducing or oxidizing agents used in ion exchange enrichment cascades;

g. Equipment and components, specially designed or prepared for atomic vapor ''laser'' isotopic separation process, as follows:

g.1. High power electron beam guns with total power of more than 50 kW and strip or scanning electron beam guns with a delivered power of more than 2.5 kW/cm for use in uranium vaporization systems;

g.2. Trough shaped crucibles and cooling equipment made of or protected by materials resistant to heat and corrosion of molten uranium or uranium alloy's (e.g., tantalum, yttria-coated graphite, graphite coated with other rare earth oxides or mixtures thereof);

N.B: See also 2A225.

g.3. Product and tails collector systems made of or lined with materials resistant to the heat and corrosion of uranium vapor, such as yttria-coated graphite or tantalum;

g.4. Separator module housings (cylindrical or rectangular vessels) for containing the uranium metal vapor source, the electron beam gun and the product and tails collectors;

g.5. ''Lasers'' or ''laser'' systems for the separation of uranium isotopes with a spectrum frequency stabilizer for operation over extended periods of time;

N.B.: See also 6A005 and 6A205.

h. Equipment and components, specially designed or prepared for molecular ''laser'' isotopic separation process, as follows:

h.1. Supersonic expansion nozzles for cooling mixtures of UF_6 and carrier gas to 150 K or less and made from UF_6 resistant materials;

h.2. Uranium fluoride (UF_5) product collectors consisting of filter, impact, or cyclone-type collectors or combinations thereof, and made of UF_5/UF_6 resistant materials (e.g. aluminum, aluminum alloys, nickel or alloys containing 60 weight percent of nickel and UF_6 resistant fully fluorinated hydrocarbon polymers);

h.3. Equipment for fluorinating UF_5 to UF_6;

h.4. Compressors made of or protected by materials resistant to UF_6 (e.g., aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel), and rotary shaft seals therefor;

h.5. Process systems for separating UF_6 from carrier gas (e.g., nitrogen or argon) including:

h.5.a. Cryogenic heat exchangers and cryoseparators capable of temperatures of −120 °C or less;

h.5.b. Cryogenic refrigeration units capable of temperatures of −120 °C or less;

h.5.c. UF6 cold traps capable of temperatures of −20 °C or less;

h.6. ''Lasers'' or ''laser'' systems for the separation of uranium isotopes with a spectrum frequency stabilizer for operation over extended periods of time;

N.B.: See also 6A005 and 6A205.

i. Equipment and components, specially designed or prepared for plasma separation process, as follows:

i.1. Product and tails collectors made of or protected by materials resistant to the heat and corrosion of uranium vapor such as yttria-coated graphite or tantalum;

i.2. Radio frequency ion excitation coils for frequencies of more than 100 kHz and capable of handling more than 40 kW mean power;

i.3. Microwave power sources and antennae for producing or accelerating ions, with an output frequency greater than 30 GHz and mean power output greater than 50 kW;

i.4. Uranium plasma generation systems;

i.5. Liquid uranium metal handling systems consisting of crucibles, made of or protected by suitable corrosion and heat resistant materials (e.g., tantalum, yttria-coated graphite, graphite coated with other rare earth oxides or mixtures thereof), and cooling equipment for the crucibles;

N.B.: See also 2A225.

i.6. Separator module housings (cylindrical) for containing the uranium plasma source, radio-frequency drive coil and the product and tails collectors and made of a suitable non-magnetic material (e.g. stainless steel);

j. Equipment and components, specially designed or prepared for electromagnetic separation process, as follows:

j.1. Ion sources, single or multiple, consisting of a vapor source, ionizer, and beam accelerator made of suitable materials (e.g., graphite, stainless steel, or copper) and capable of providing a total ion beam current of 50 mA or greater;

j.2. Ion collector plates for collection of enriched or depleted uranium ion beams, consisting of two or more slits and pockets and made of suitable non-magnetic materials (e.g., graphite or stainless steel);

j.3. Vacuum housings for uranium electromagnetic separators made of non-magnetic materials (e.g. graphite or stainless steel) and designed to operate at pressures of 0.1 Pa or lower;

j.4. Magnet pole pieces with a diameter greater than 2 m;

j.5. High voltage power supplies for ion sources, having all of the following characteristics:

j.5.a. Capable of continuous operation;

j.5.b. Output voltage of 20,000 V or greater;

j.5.c. Output current of 1 A or greater;

j.5.d. Voltage regulation of better than 0.01% over a period of 8 hours;

N.B.: See also 3A227.

j.6. Magnet power supplies (high power, direct current) having all of the following characteristics:

j.6.a. Capable of continuous operation with a current output of 500 A or greater at a voltage of 100 V or greater;

j.6.b. Current or voltage regulation better than 0.01% over a period of 8 hours.

N.B.: See also 3A226.

0B002 Specially designed or prepared auxiliary systems, equipment and components, as follows, (see List of Items Controlled) for isotope separation plant specified in 0B001, made of or protected by UF_6 resistant materials.

LICENSE REQUIREMENTS

Reason for Control:

Control(s): Items described in 0B002 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Feed autoclaves, ovens or systems used for passing UF_6 to the enrichment process;

b. Desublimers or cold traps, used to remove UF_6 from the enrichment process for subsequent transfer upon heating;

c. Product and tails stations for transferring UF_6 into containers;

d. Liquefaction or solidification stations used to remove UF_6 from the enrichment process by compressing and converting UF_6 to a liquid or solid form;

e. Piping systems and header systems specially designed for handling UF_6 within gaseous diffusion, centrifuge or aerodynamic cascades made of or protected by UF_6 resistant materials;

f.1. Vacuum manifolds or vacuum headers having a suction capacity of 5 m^3/minute or more; *or*

f.2. Vacuum pumps specially designed for use in UF_6 bearing atmospheres;

g. UF_6 mass spectrometers/ion sources specially designed or prepared for taking on-line samples of feed, product or tails from UF_6 gas streams and having all of the following characteristics:

g.1. Unit resolution for mass of more than 320 amu;

g.2. Ion sources constructed of or lined with nichrome or monel, or nickel plated;

g.3. Electron bombardment ionization sources; and

g.4. Collector system suitable for isotopic analysis.

0B003 Plant for the production of uranium hexafluoride (UF_6) and specially designed or prepared equipment and components therefor, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $ value
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Plant for the production of UF_6;

b. Equipment and components, as follows, specially designed of prepared for UF_6 production:

b.1. Fluorination and hydrofluorination screw and fluid bed reactors and flame towers;

b.2. Distillation equipment for the purification of UF_6.

0B004 Plant for the production of heavy water, deuterium or deuterium compounds, and specially designed or prepared equipment and components therefor, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:

Control(s): Items described in 0B004 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Plant for the production of heavy water, deuterium or deuterium compounds, as follows:

a.1. Hydrogen sulphide-water exchange plants;

a.2. Ammonia-hydrogen exchange plants;

a.3. Hydrogen distillation plants;

b. Equipment and components, as follows, designed for:

b.1. Hydrogen sulphide-water exchange process:

b.1.a. Tray exchange towers;

b.1.b. Hydrogen sulphide gas compressors;

b.2. Ammonia-hydrogen exchange process:

b.2.a. High-pressure ammonia-hydrogen exchange towers;

b.2.b. High-efficiency stage contactors;

b.2.c. Submersible stage recirculation pumps;

b.2.d. Ammonia crackers designed for pressures of more than 3 MPa;

b.3. Hydrogen distillation process:

b.3.a. Hydrogen cryogenic distillation towers and cold boxes designed for operation below 35 K (−238° C);

b.3.b. Turboexpanders or turboexpander-compressor sets designed for operation below 35 K (−238° C);

b.4. Heavy water concentration process to reactor grade level (99.75 weight percent deuterium oxide):

b.4.a. Water distillation towers containing specially designed packings;

b.4.b. Ammonia distillation towers containing specially designed packings;

b.4.c. Catalytic burners for conversion of fully enriched deuterium to heavy water;

b.4.d. Infrared absorption analyzers capable of on-line hydrogen-deuterium ratio analysis where deuterium concentrations are equal to or more than 90 weight percent.

0B005 Plant specially designed for the fabrication of "nuclear reactor" fuel elements and specially designed equipment therefor.

LICENSE REQUIREMENTS

Reason for Control:

Control(s): Items described in 0B005 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: A plant for the fabrication of ''nuclear reactor'' fuel elements includes equipment which: (a) Normally comes into direct contact with or directly processes or controls the production flow of nuclear materials; (b) Seals the nuclear materials within the cladding; (c) Checks the integrity of the cladding or the seal; *and* (d) Checks the finish treatment of the solid fuel
Items: The List of Items Controlled is contained in the ECCN heading

0B006 Plant for the reprocessing of irradiated "nuclear reactor" fuel elements, and specially designed or prepared equipment and components therefor, including (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:

Control(s): Items described in 0B006 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Fuel element chopping or shredding machines, i.e. remotely operated equipment to cut, chop, shred or shear irradiated ''nuclear reactor'' fuel assemblies, bundles or rods;

b. Dissolvers, critically safe tanks (e.g. small diameter, annular or slab tanks) specially designed or prepared for the dissolution of irradiated ''nuclear reactor'' fuel, which are capable of withstanding hot, highly corrosive liquids, and which can be remotely loaded and maintained;

c. Counter-current solvent extractors and ion-exchange processing equipment specially designed or prepared for use in a plant for the reprocessing of irradiated ''natural uranium'', ''depleted uranium'' or ''special fissile materials'' and ''other fissile materials'';

d. Process control instrumentation specially designed or prepared for monitoring or controlling the reprocessing of irradiated ''natural uranium'', ''depleted uranium'' or ''special fissile materials'' and ''other fissile materials'';

e. Holding or storage vessels specially designed to be critically safe and resistant to the corrosive effects of nitric acid;

NOTE: Critically safe tanks may have the following features:

1. Walls or internal structures with a boron equivalent of at least two percent;

2. A maximum diameter or 175 mm for cylindrical vessels; or

3. A maximum width of 75 mm for either a slab or annular vessel.

f. Complete systems specially designed or prepared for the conversion of plutonium nitrate to plutonium oxide;

g. Complete systems specially designed or prepared for the production of plutonium metal.

NOTE: Plant for the reprocessing of irradiated ''nuclear reactor'' fuel elements includes equipment and components which normally come into direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.

0B008 Equipment for "nuclear reactors".

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $ value

GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Simulators specially designed for ''nuclear reactors'';

b. Ultrasonic or eddy current test equipment specially designed for ''nuclear reactors''.

0B009 Plant for the conversion of uranium and equipment specially designed or prepared therefor, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0B009 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Systems for the conversion of uranium ore concentrates to UO_3;

b. Systems for the conversion of UO_3 to UF_6;

c. Systems for the conversion of UO_3 to UO_2;

d. Systems for the conversion of UO_2 to UF_4;

e. Systems for the conversion of UF_4 to UF_6;

f. Systems for the conversion of UF_4 to uranium metal;

g. Systems for the conversion of UF_6 to UO_2;

h. Systems for the conversion of UF_6 to UF_4.

0B986 Equipment specially designed for manufacturing shotgun shells; and ammunition hand-loading equipment for both cartridges and shotgun shells.

LICENSE REQUIREMENTS

Reason for Control: UN
Control(s): UN applies to entire entry. A license is required for items controlled by this entry to Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro). The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

C. MATERIALS

0C001 "Natural uranium" or "depleted uranium" or thorium in the form of metal, alloy, chemical compound or concentrate and any other material containing one or more of the foregoing.

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0C001 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: (1) See also 1A290. (2) This entry does not control: (a) Four grams or less of ''natural uranium'' or ''depleted uranium'' when contained in a sensing component in instruments (see 10 CFR part 110); or (b) ''Depleted uranium'' specially fabricated for the following civil non-nuclear applications: Shielding; Packaging; Ballasts; or Counter-weights
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

0C002 "Special fissile materials" and "other fissile materials"; except, four "effective grams" or less when contained in a sensing component in instruments.

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0C002 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The List of Items Controlled is Contained in the ECCN heading

0C004 Deuterium, heavy water, deuterated paraffins and other compounds of deuterium, and mixtures and solutions containing deuterium, in which the isotopic ratio of deuterium to hydrogen exceeds 1:5000.

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0C004 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

0C005 Graphite, nuclear-grade, having a purity level of less than 5 parts per million "boron equivalent" and with a density greater than 1.5 g/cm ^{3}.

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0C005 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

0C006 Nickel powder or porous nickel metal, specially prepared for the manufacture of gaseous diffusion barriers, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0C006 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 1C240
Related Definitions: N/A
Items: a. Powder with a nickel purity content of 99.9 weight percent or more and a mean particle size of less than 10 micrometers measured by American Society for Testing and Materials (ASTM) B330 standard and a high degree of particle size uniformity; *or*

b. Porous nickel metal produced from materials specified in 0C006.a.

0C201 Specially prepared compounds or powders, other than nickel, resistant to corrosion by UF_6 (e.g. aluminum oxide and fully fluorinated hydrocarbon polymers), for the manufacture of gaseous diffusion barriers, having a purity of 99.9 weight percent or more and a mean particle size of less than 10 micrometers measured by American Society for Testing and Materials (ASTM) B330 standard and a high degree of particle size uniformity.

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 0C201 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

D. SOFTWARE

0D001 "Software" specially designed or modified for the "development", "production" or "use" of goods controlled by this Category.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to "software" for items controlled by 0B003.	NP Column 1
NP applies to "software" for items controlled by 0B008.	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) "Software" for items controlled by 0A001, 0A002, 0B001, 0B002, 0B004, 0B005, 0B006, 0B009, 0C001, 0C002, 0C004, 0C005, 0C006, and 0C201 are subject to

the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). (2) ''Software'' for items controlled by 0A002 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121)

Related Definitions: N/A

Items: The List of Items Controlled is contained in the ECCN heading

E. TECHNOLOGY

0E001 "Technology" according to the Nuclear Technology Note for the "development", "production" or "use" of items controlled by this Category.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to ''technology'' for items controlled by 0B003.	NP Column 1
NP applies to ''technology'' for items controlled by 0B008.	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: ''Technology'' for items controlled by 0A001, 0A002, 0B001, 0B002, 0B004, 0B005, 0B006, 0B009, 0C001, 0C002, 0C004, 0C005, 0C006, and 0C201 are subject to the export licensing authority of the Department of Energy (see 10 CFR part 810)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

0E018 "Technology" for the "development", "production", or "use" of items controlled by 0A018.b through 0A018.e.

LICENSE REQUIREMENTS

Reason for Control: NS, UN, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).
AT applies to entire entry	AT Column 1.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

0E984 "Technology" for the "development" or "production" of shotguns controlled by 0A984 and buckshot shotgun shells.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to ''technology'' for shotguns with a barrel length over 18 in. (45.72 cm) but less than 24 in. (60.96 cm) and shotgun shells, regardless of end-user.	CC Column 1.
CC applies to ''technology'' for shotguns with a barrel length greater than or equal to 24 in. (60.96 cm), regardless of end-user.	CC Column 2.
CC applies to ''technology'' for shotguns with a barrel length greater than or equal to 24 in. (60.96 cm) if for sale or resale to police or law enforcement.	CC Column 3.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 1—Materials, Chemicals, ''Microorganisms'' & ''Toxins''

A. SYSTEMS, EQUIPMENT AND COMPONENTS

1A001 Components made from fluorinated compounds, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: Items specially designed or modified for missiles or for items on the U.S. Munitions List are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121.)

Related Definitions: N/A

Items: a. Seals, gaskets, sealants or fuel bladders specially designed for ''aircraft'' or aerospace use made from more than 50% by weight of any of the materials controlled by 1C009.b or 1C009.c;

b. Piezoelectric polymers and copolymers made from vinylidene fluoride materials controlled by 1C009.a:

b.1. In sheet or film form; *and*

b.2. With a thickness exceeding 200 μm;

c. Seals, gaskets, valve seats, bladders or diaphragms made from fluoroelastomers containing at least one vinylether monomer, specially designed for ''aircraft'', aerospace or missile use.

1A002 "Composite" structures or laminates, having any of the following (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry except finished or semi-finished items specially designed for purely civilian applications as follows: sporting goods, automotive industry, machine tool industry, and medical applications.	NS Column 2
NP applies to 1A002.b.1 in the form of tubes with an inside diameter between 75 mm and 400 mm.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $1500; N/A for ''composite'' structures or laminates controlled by 1A002.a, having an organic ''matrix'' and made from materials controlled by 1C010.c or 1C010.d

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: (1) See also 1A202, 9A010, and 9A110. (2) This entry does not control ''composite'' structures or laminates made from epoxy resin impregnated carbon ''fibrous or filamentary materials'' for the repair of aircraft structures of laminates, provided that the size does not exceed one square meter (1 m^2)

Related Definitions: N/A

Items: a. An organic ''matrix'' and made from materials controlled by 1C010.c, 1C010.d or 1C010.e; *or*

b. A metal or carbon ''matrix'' and made from:

b.1. Carbon ''fibrous or filamentary materials'' with:

b.1.a. A ''specific modulus'' exceeding 10.15×10^6 m; *and*

b.1.b. A ''specific tensile strength'' exceeding 17.7×10^4 m; *or*

b.2. Materials controlled by 1C010.c.

TECHNICAL NOTES: (1) Specific modulus: Young's modulus in pascals, equivalent to N/m^2 divided by specific weight in N/m^3, measured at a temperature of (296±2) K ((23±2) C) and a relative humidity of (50±5)%. (2) Specific tensile strength: ultimate tensile strength in pascals, equivalent to N/m^2 divided by specific weight in N/m^3, measured at a temperature of (296±2) K ((23±2) C) and a relative humidity of (50±5)%.

1A003 Manufactures of non-fluorinated polymeric substances controlled by 1C008.a.3 in film, sheet, tape or ribbon form with either of the following characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $200

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: This entry does not control manufactures when coated or laminated with copper and designed for the production of electronic printed circuit boards

Related Definitions: N/A

Items: a. With a thickness exceeding 0.254 mm; *or*

b. Coated or laminated with carbon, graphite, metals or magnetic substances

1A004 Protective and detection equipment and components, not specially designed for military use. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

1A005 Body armor, and specially designed components therefor, not manufactured to military standards or specifications, nor to their equivalents in performance.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) Bulletproof and bullet resistant vests (body armor) NIJ levels III and IV, are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) This entry does not control individual suits of body armor and accessories therefor, when accompanying their users for his/her own personal protection. (3) This entry does not control body armor designed to provide frontal protection only from both fragment and blast from non-military explosive devices
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1A102 Resaturated pyrolized carbon-carbon materials designed for "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

1A202 Composite structures, other than those controlled by 1A002, in the form of tubes with an inside diameter of between 75 mm and 400 mm made with any of the "fibrous or filamentary materials" specified in 1C210.a or with carbon prepreg materials controlled by 1C210.c.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See also 9A010 and 9A110
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1A225 Platinized catalysts specially designed or prepared for promoting the hydrogen isotope exchange reaction between hydrogen and water for the recovery of tritium from heavy water or for the production of heavy water.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1A226 Specialized packings for use in separating heavy water from ordinary water and made of phosphor bronze mesh (chemically treated to improve wettability) and designed for use in vacuum distillation towers.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1A227 High-density (lead glass or other) radiation shielding windows greater than 0.09 m^2 on cold area and with a density greater than 3 g/cm^3 and a thickness of 100 mm or greater; and specially designed frames therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1A290 Depleted uranium (any uranium containing less than 0.711% of the isotope U–235) in shipments of more than 1,000 kilograms in the form of shielding contained in X-ray units, radiographic exposure or teletherapy devices, radioactive thermoelectric generators, or packaging for the transportation of radioactive materials.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: (1) This entry does not control depleted uranium in fabricated forms for use in munitions. See 22 CFR part 121 for depleted uranium subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (2) Depleted uranium that is not fabricated for use in munitions or fabricated into commodities solely to take advantage of its high density (e.g., aircraft, ship, or other counterweights) or in the forms listed in this entry are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.) (3) See also 0C001
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1A984 Chemical agents, including tear gas formulation containing 1 percent or less of orthochlorobenzalmalononitrile (CS), or 1 percent or less of chloroacetophenone (CN), except in individual containers with a net weight of 20 grams or less; smoke bombs; non-irritant smoke flares, canisters, grenades and charges; other pyrotechnic articles having dual military and commercial use; and fingerprinting powders, dyes and inks.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

1B001 Equipment for the production of fibers, prepregs, preforms or "composites" controlled by 1A002 or 1C010, and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry, except 1B001.d.4 and .f.	MT Column 1
NP applies to filament winding machines described in 1B001.a that are capable of winding cylindrical rotors having a diameter between 75 mm (3 in) and 400 mm (16 in) and lengths of 600 mm (24 in) or greater; and coordinating and programming controls and precision mandrels for these filament winding machines.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A for MT and for 1B001.a; $5,000 for all other items
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 1B101 and 1B201; and for accelerators and systems containing accelerators see 3A101
Related Definitions: N/A
Items: a. Filament winding machines of which the motions for positioning, wrapping and winding fibers are coordinated and programmed in three or more axes, specially designed for the manufacture of ''composite'' structures or laminates from ''fibrous or filamentary materials'';

b. Tape-laying or tow-placement machines of which the motions for positioning and laying tape, tows or sheets are coordinated and programmed in two or more axes, specially designed for the manufacture of ''composite'' airframe or ''missile'' structures;

c. Multidirectional, multidimensional weaving machines or interlacing machines, including adapters and modification kits, for weaving, interlacing or braiding fibers to manufacture ''composite'' structures;

NOTE: 1B001.c does not control textile machinery not modified for the above end-uses.

d. Equipment specially designed or adapted for the production of reinforcement fibers, as follows:

d.1. Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon, pitch or polycarbosilane) into carbon fibers or silicon carbide fibers, including special equipment to strain the fiber during heating;

d.2. Equipment for the chemical vapor deposition of elements or compounds on heated filamentary substrates to manufacture silicon carbide fibers;

d.3. Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide);

d.4. Equipment for converting aluminum containing precursor fibers into alumina fibers by heat treatment;

e. Equipment for producing prepregs controlled by 1C010.e by the hot melt method;

f. Non-destructive inspection equipment capable of inspecting defects three dimensionally, using ultrasonic or X-ray tomography and specially designed for ''composite'' materials.

1B002 Systems and components therefor, specially designed to avoid contamination and specially designed for producing metal alloys, metal alloy powder or alloyed materials controlled by 1C002.a.2, 1C002.b or 1C002.c.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1B003 Tools, dies, molds or fixtures, for "superplastic forming" or "diffusion bonding" titanium or aluminum or their alloys, specially designed for the manufacture of (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; components in $ value
Related Controls: For specially designed production equipment of systems, sub-systems and components controlled by 9A005 to 9A009, 9A011, 9A101, 9A105 to 9A109, 9A111, and 9A116 to 9A120 usable in ''missiles'', see 9B115.
Related Definitions: N/A
Items: a. Airframe or aerospace structures;

b. ''Aircraft'' or aerospace engines; *or*

c. Specially designed components for those structures or engines.

1B018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
MT applies to equipment for the ''production'' of rocket propellants.	MT Column 1.
RS applies to 1B018.a	RS Column 2.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $3000 for 1B018.a for countries WITHOUT an ''X'' in RS Column 2 on the Country Chart contained in Supplement No. 1 to part 738 of the EAR $5000 for 1B018.b N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Equipment for the ''production'' of military explosives and solid propellants.

a.1. Complete installations;

a.2. Specialized components (for example, dehydration presses; extrusion presses for

the extrusion of small arms, cannon and rocket propellants; cutting machines for the sizing of extruded propellants; sweetie barrels (tumblers) 6 feet and over in diameter and having over 500 pounds product capacity; and continuous mixers for solid propellants); or

a.3. Nitrators, continuous types; and

a.4. Specially designed parts and accessories therefor.

b. Environmental chambers capable of pressures below (10^{-4}) Torr, and specially designed components therefor.

1B101 Equipment, other than that controlled by 1B001, for the "production" of structural composites, and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 1B101.a only	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: See also 1B201

Related Definitions: Components and accessories controlled by this entry include molds, mandrels, dies, fixtures and tooling for the preform processing, curing, casting, sintering or bonding of composite structures, laminates and manufactures thereof

Items: a. Filament winding machines of which the motions for positioning, wrapping and winding fibers can be coordinated and programmed in three or more axes, designed to fabricate composite structures or laminates from fibrous or filamentary materials, and coordinating and programming controls;

b. Tape-laying machines of which the motions for positioning and laying tape and sheets can be coordinated and programmed in two or more axes, designed for the manufacture of composite airframe and ''missile'' structures;

c. Equipment designed or modified for the ''production'' of ''fibrous or filamentary materials'' as follows:

c.1. Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon or polycarbosilane) including special provision to strain the fiber during heating;

c.2. Equipment for the vapor deposition of elements or compounds on heated filament substrates; and

c.3. Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide);

d. Equipment designed or modified for special fiber surface treatment or for producing prepregs and preforms controlled by 9A110.

NOTE: Equipment covered in 1B101.d includes but is not limited to, rollers, tension stretchers, coating equipment, cutting equipment and clicker dies.

1B115 Equipment for the "production", handling and acceptance testing of propellants or propellant constituents controlled by 1C011, 1C111 or on the U.S. Munitions List, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; components in $ value

Related Controls: (1) The only batch or continuous mixers controlled by this entry are those which have provision for mixing under vacuum in the range of zero to 13.326 kPa and with a temperature control capacity of the mixing chamber: (a) Batch mixers having a total volumetric capacity of 110 liters or more and at least one mixing/kneeding shaft mounted off center; (b) Continuous mixers having two or more mixing/kneeding shafts and capability to open the mixing chamber. (2) For equipment specially designed for the production of military propellants or propellant consistuents, see the U.S. Munitions List. (3) This entry does control equipment for the ''production'', handling and acceptance testing of boron carbide

Related Definitions: N/A.

Items: The list of items controlled is contained in the ECCN heading

1B116 Specially designed nozzles for producing pyrolitically derived materials formed on a mold, mandrel or other substrate from precursor gases which decompose in the 1,573 K (1,300 °C) to 3,173 K (2,900 °C) temperature range at pressures of 130 Pa to 20 kPa.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1B201 Filament winding machines, other than those controlled by 1B001 or 1B101, in which the motions for positioning, wrapping, and winding fibers are coordinated and programmed in two or more axes, specially designed to fabricate composite structures or laminates from "fibrous or filamentary materials" and capable of winding cylindrical rotors of diameter between 75 mm and 400 mm and lengths of 600 mm or greater and coordinating and programming controls and precision mandrels therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1B225 Electrolytic cells for fluorine production with a production capacity greater than 250 g of fluorine per hour.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1B226 Electromagnetic isotope separators, designed for or equipped with, single or multiple ion sources capable of providing a total ion beam current of 50 mA or greater.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry includes separators capable of enriching stable isotopes and separators with the ion sources and collections both in the magnetic field and those configurations in which they are external to the field
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1B227 Ammonia synthesis converters or ammonia synthesis units in which the synthesis gas (nitrogen and hydrogen) is withdrawn from an ammonia/hydrogen high-pressure exchange column and the synthesized ammonia is returned to that column.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

1B228 Hydrogen-cryogenic distillation columns having all of the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: Heavy water production equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)

Related Definitions: ''Fine-grain stainless steels'' in this entry are defined to be fine-grain austenitic stainless steels with an ASTM (or equivalent standard) grain size number of 5 or greater

Items: a. Designed to operate with internal temperatures of 35 K (−238 °C) or less;

b. Designed to operate at an internal pressure of 0.5 to 5 MPa (5 to 50 atmospheres);

c. Constructed of ''fine-grain stainless steels'' of the 300 series with low sulphur content or equivalent cryogenic and H_2-compatible materials; *and*

d. With internal diameters of 1 m or greater and effective lengths of 5 m or greater.

1B229 Water-hydrogen sulphide exchange tray columns constructed from fine carbon steel with a diameter of 1.8 m or greater, which can operate at a nominal pressure of 2 MPa or greater, and internal contactors therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: (1) See 0B004 for columns which are specially designed or prepared for the production of heavy water. These items are controlled on the NSG Trigger List (INFCIRC/254/part (2) See 10 CFR part 110 for heavy water production equipment subject to the export licensing authority of the Nuclear Regulatory Commission

Related Definition: (1) This entry includes internal contactors of the columns are segmented trays with an effective assembled diameter of 1.8 m (6 ft.) or greater, are designed to facilitate countercurrent contacting and constructed of materials resistant to corrosion by hydrogen sulfide/water mixtures. These may be sieve trays, valve trays, bubble cap trays or turbogrid trays. (2) Fine carbon steel in this entry is defined to be steel with the austenitic ASTM (or equivalent standard) grain size number of 5 or greater. (3) Materials resistant to corrosion by hydrogen sulfide/water mixtures in this entry are defined to be stainless steels with a carbon content of 0.03% or less

Items: The list of items controlled is contained in the ECCN heading

1B230 Pumps circulating solutions of diluted or concentrated potassium amide catalyst in liquid ammonia (KNH_2/NH_3), with all of the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: Heavy water production equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)

Related Definitions: N/A

Items: a. Airtight (i.e., hermetically sealed);

b. For concentrated potassium amide solutions (1% or greater), operating pressure of 1.5–60 MPa (15–600 atmospheres); for dilute potassium amide solutions (less than 1%), operating pressure of 20–60 MPa (200–600 atmospheres); *and*

c. A capacity greater than 8.5 m^3/hr.

1B231 Tritium facilities, plant or equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: This entry does not control tritium, tritium compounds, and mixtures containing tritium, or products or devices thereof. See 10 CFR part 110 for tritium subject to the export licensing authority of the Nuclear Regulatory Commission

Related Definitions: N/A

Items: a. Facilities or plant for the production, recovery, extraction, concentration, or handling of tritium;

b. Equipment for tritium facilities or plant, as follows:

b.1. Hydrogen or helium refrigeration units capable of cooling to 23 K (−250 C) or less, with heat removal capacity greater than 150 watts; *or*

b.2. Hydrogen isotope storage and purification systems using metal hydrides as the storage, or purification medium.

1B232 Turboexpanders or turboexpander-compressor sets designed for operation below 35 K (−238° C) and a throughput of hydrogen gas of 1000 kg/hr or greater.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1B233 Lithium isotope separation facilities, plant or equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 1B233 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Facilities or plant for the separation of lithium isotopes;

b. Equipment for the separation of lithium isotopes, as follows:

b.1. Packed liquid-liquid exchange columns specially designed for lithium amalgams;

b.2. Mercury and/or lithium amalgam pumps;

b.3. Lithium amalgam electrolysis cells;

b.4. Evaporators for concentrated lithium hydroxide solution.

C. MATERIALS

TECHNICAL NOTE: Metals and alloys: Unless provision to the contrary is made, the words ''metals'' and ''alloys'' in 1C001 to 1C012 cover crude and semi-fabricated forms, as follows:

Crude forms: Anodes, balls, bars (including notched bars and wire bars), billets, blocks, blooms, brickets, cakes, cathodes, crystals, cubes, dice, grains, granules, ingots, lumps, pellets, pigs, powder, rondelles, shot, slabs, slugs, sponge, sticks;

Semi-fabricated forms (whether or not coated, plated, drilled or punched):

a. Wrought or worked materials fabricated by rolling, drawing, extruding, forging, impact extruding, pressing, graining, atomizing, and grinding, i.e.: angles, channels, circles, discs, dust, flakes, foils and leaf, forging, plate, powder, pressings and stampings, ribbons, rings, rods (including bare welding rods, wire rods, and rolled wire), sections, shapes, sheets, strip, pipe and tubes (including tube rounds, squares, and hollows), drawn or extruded wire;

b. Cast material produced by casting in sand, die, metal, plaster or other types of molds, including high pressure castings, sintered forms, and forms made by powder metallurgy.

The object of the control should not be defeated by the export of non-listed forms alleged to be finished products but representing in reality crude forms or semi-fabricated forms.

1C001 Materials specially designed for use as absorbers of electromagnetic waves, or intrinsically conductive polymers, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See also 1C101
Related Definitions: N/A
Items: a. Materials for absorbing frequencies exceeding 2×10^8 Hz but less than 3×10^{12} Hz.

NOTES: 1. 1C001.a does not control:

a. Hair type absorbers, constructed of natural or synthetic fibers, with non-magnetic loading to provide absorption;

b. Absorbers having no magnetic loss and whose incident surface is non-planar in shape, including pyramids, cones, wedges and convoluted surfaces;

c. Planar absorbers, having all of the following characteristics:

1. Made from any of the following:

a. Plastic foam materials (flexible or non-flexible) with carbon-loading, or organic materials, including binders, providing more than 5% echo compared with metal over a bandwidth exceeding ±15% of the center frequency of the incident energy, and not capable of withstanding temperatures exceeding 450 K (177° C); *or*

b. Ceramic materials providing more than 20% echo compared with metal over a bandwidth exceeding ±15% of the center frequency of the incident energy, and not capable of withstanding temperatures exceeding 800 K (527° C);

TECHNICAL NOTE: Absorption test samples for 1C001.a. Note 1.c.1 should be a square at least 5 wavelengths of the center frequency on a side and positioned in the far field of the radiating element.

2. Tensile strength less than 7×10^6 N/m^2; *and*

3. Compressive strength less than 14×10^6 N/m^2;

d. Planar absorbers made of sintered ferrite, having:

1. A specific gravity exceeding 4.4; *and*

2. A maximum operating temperature of 548 K (275° C).

NOTE 2: Nothing in 1C001.a releases magnetic materials to provide absorption when contained in paint.

b. Materials for absorbing frequencies exceeding 1.5×10^{14} Hz but less than 3.7×10^{14} Hz and not transparent to visible light;

c. Intrinsically conductive polymeric materials with a bulk electrical conductivity exceeding 10,000 S/m (Siemens per meter) or a sheet (surface) resistivity of less than 100 ohms/square, based on any of the following polymers:

c.1. Polyaniline;

c.2. Polypyrrole;

c.3. Polythiophene;

c.4. Poly phenylene-vinylene; *or*

c.5. Poly thienylene-vinylene.

TECHNICAL NOTE: Bulk electrical conductivity and sheet (surface) resistivity should be determined using ASTM D–257 or national equivalents.

1C002 Metal alloys, metal alloy powder and alloyed materials, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 1C002.a.2.c or a.2.d if they exceed the parameters stated in 1C202.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: See also 1C202. This entry does not control metal alloys, metal alloy powder or alloyed materials for coating substrates

Related Definition: N/A

Items: a. Metal alloys, as follows:

a.1. Nickel or titanium-based alloys in the form of aluminides, as follows, in crude or semi-fabricated forms:

a.1.a. Nickel aluminides containing a minimum of 15 weight percent aluminum, a maximum of 38 weight percent aluminum and at least one additional alloying element;

a.1.b. Titanium aluminides containing 10 weight percent or more aluminum and at least one additional alloying element;

a. 2. Metal alloys, as follows, made from metal alloy powder or particulate material controlled by 1C002.b:

a.2.a. Nickel alloys with:

a.2.a.1. A stress-rupture life of 10,000 hours or longer at 923 K (650° C) at a stress of 676 MPa; *or*

a.2.a.2. A low cycle fatigue life of 10,000 cycles or more at 823 K (550° C) at a maximum stress of 1,095 MPa;

a.2.b. Niobium alloys with:

a.2.b.1. A stress-rupture life of 10,000 hours or longer at 1,073 K (800° C) at a stress of 400 MPa; *or*

a.2.b.2. A low cycle fatigue life of 10,000 cycles or more at 973 K (700° C) at a maximum stress of 700 MPa;

a.2.c. Titanium alloys with:

a.2.c.1. A stress-rupture life of 10,000 hours or longer at 723 K (450° C) at a stress of 200 MPa; *or*

a.2.c.2. A low cycle fatigue life of 10,000 cycles or more at 723 K (450° C) at a maximum stress of 400 MPa;

a.2.d. Aluminum alloys with a tensile strength of:

a.2.d.1. 240 MPa or more at 473 K (200° C); *or*

a.2.d.2. 415 MPa or more at 298 K (25° C);

a.2.e. Magnesium alloys with a tensile strength of 345 MPa or more and a corrosion rate of less than 1 mm/year in 3% sodium chloride aqueous solution measured in accordance with ASTM standard G–31 or national equivalents;

TECHNICAL NOTE 1: The metal alloys in 1C002.a are those containing a higher percentage by weight of the stated metal than of any other element.

TECHNICAL NOTE 2: Stress-rupture life should be measured in accordance with ASTM standard E–139 or national equivalents.

TECHNICAL NOTE 3: Low cycle fatigue life should be measured in accordance with

ASTM Standard E–606 ''Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing'' or national equivalents. Testing should be axial with an average stress ratio equal to 1 and a stress-concentration factor (K_t) equal to 1. The average stress is defined as maximum stress minus minimum stress divided by maximum stress.

b. Metal alloy powder or particulate material for materials controlled by 1C002.a, as follows:

b.1. Made from any of the following composition systems:

TECHNICAL NOTE: X in the following equals one or more alloying elements.

b.1.a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine parts or components, i.e. with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 μm in 10^9 alloy particles;

b.1.b. Niobium alloys (Nb-Al-X or Nb-X-Al, Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti);

b.1.c. Titanium alloys (Ti-Al-X or Ti-X-Al);

b.1.d. Aluminum alloys (Al-Mg-X or Al-X-Mg, Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); *or*

b.1.e. Magnesium alloys (Mg-Al-X or Mg-X-Al); *and*

b.2. Made in a controlled environment by any of the following processes:

b.2.a. ''Vacuum atomization'';

b.2.b. ''Gas atomization'';

b.2.c. ''Rotary atomization'';

b.2.d. ''Splat quenching'';

b.2.e. ''Melt spinning'' and ''comminution'';

b.2.f. ''Melt extraction'' and ''comminution''; *or*

b.2.g. ''Mechanical alloying'';

c. Alloyed materials, in the form of uncomminuted flakes, ribbons or thin rods produced in a controlled environment by ''splat quenching'', ''melt spinning'' or ''melt extraction'', used in the manufacture of metal alloy powder or particulate material controlled by 1C002.b.

1C003 Magnetic metals, of all types and of whatever form, having any of the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Initial relative permeability of 120,000 or more and a thickness of 0.05 mm or less;

TECHNICAL NOTE: Measurement of initial permeability must be performed on fully annealed materials.

b. Magnetostrictive alloys, having any of the following characteristics:

b.1. A saturation magnetostriction of more than 5×10^{-4}; *or*

b.2. A magnetomechanical coupling factor (k) of more than 0.8; *or*

c. Amorphous or nanocrystalline alloy strips, having all of the following characteristics:

c.1. A composition having a minimum of 75 weight percent of iron, cobalt or nickel;

c.2. A saturation magnetic induction (B_s) of 1.6 T or more; *and*

c.3. Any of the following:

c.3.a. A strip thickness of 0.02 mm or less; *or*

c.3.b. An electrical resistivity of 2×10^{-4}; ohm cm or more.

TECHNICAL NOTE: Nanocrystalline materials in 1C003.c are those materials having a crystal grain size of 50 nm or less, as determined by X-ray diffraction.

1C004 Uranium titanium alloys or tungsten alloys with a "matrix" based on iron, nickel or copper, having all of the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. A density exceeding 17.5 g/cm ^{3};

b. An elastic limit exceeding 1,250 MPa;

c. An ultimate tensile strength exceeding 1,270 MPa; *and*

d. An elongation exceeding 8%.

1C005 "Superconductive" "composite" conductors in lengths exceeding 100 m or with a mass exceeding 100 g, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Multifilamentary ''superconductive'' ''composite'' conductors containing one or more niobium-titanium filaments:

a.1. Embedded in a ''matrix'' other than a copper or copper-based mixed ''matrix''; *or*

a.2. Having a cross-section area less than 0.28×10^{-4} mm² (6 μm in diameter for circular filaments);

b. ''Superconductive'' ''composite'' conductors consisting of one or more ''superconductive'' filaments other than niobium-titanium, having all of the following:

b.1. A ''critical temperature'' at zero magnetic induction exceeding 9.85 K (−263.31° C) but less than 24 K (−249.16° C);

b.2. A cross-section area less than 0.28×10^{-4} mm²; *and*

b.3. Remaining in the ''superconductive'' state at a temperature of 4.2 K (−268.96° C) when exposed to a magnetic field corresponding to a magnetic induction of 12 T.

1C006 Fluids and lubricating materials, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Barrels (55 U.S. gallons/ 209 liters)
Related Controls: N/A
Related Definitions: N/A
Items: a. Hydraulic fluids containing, as their principal ingredients, any of the following compounds or materials:

a.1. Synthetic hydrocarbon oils or silahydrocarbon oils, having all of the following:

NOTE: For the purpose of 1C006.a.1, silahydrocarbon oils contain exclusively silicon, hydrogen and carbon.

a.1.a. A flash point exceeding 477 K (204° C);

a.1.b. A pour point at 239 K (−34° C) or less;

a.1.c. A viscosity index of 75 or more; *and*

a.1.d. A thermal stability at 616 K (343° C); *or*

a.2. Chlorofluorocarbons, having all of the following:

NOTE: For the purpose of 1C006.a.2, chlorofluorocarbons contain exclusively carbon, fluorine and chlorine.

a.2.a. No flash point;

a.2.b. An autogenous ignition temperature exceeding 977 K (704° C);

a.2.c. A pour point at 219 K (−54° C) or less;

a.2.d. A viscosity index of 80 or more; *and*

a.2.e. A boiling point at 473 K (200° C) or higher;

b. Lubricating materials containing, as their principal ingredients, any of the following compounds or materials:

b.1. Phenylene or alkylphenylene ethers or thio-ethers, or their mixtures, containing more than two ether or thio-ether functions or mixtures thereof; *or*

b.2. Fluorinated silicone fluids with a kinematic viscosity of less than 5,000 mm²/s (5,000 centistokes) measured at 298 K (25° C);

c. Damping or flotation fluids with a purity exceeding 99.8%, containing less than 25 particles of 200 μm or larger in size per 100 ml and made from at least 85% of any of the following compounds or materials:

c.1. Dibromotetrafluoroethane;

c.2. Polychlorotrifluoroethylene (oily and waxy modifications only); *or*

c.3. Polybromotrifluoroethylene;

d. Fluorocarbon electronic cooling fluids, having all of the following characteristics:

d.1. Containing 85% by weight or more of any of the following, or mixtures thereof:

d.1.a. Monomeric forms of perfluoropolyalkylether-triazines or perfluoroaliphatic-ethers;

d.1.b. Perfluoroalkylamines;

d.1.c. Perfluorocycloalkanes; *or*

d.1.d. Perfluoroalkanes;

d.2. Density at 298 K (25° C) of 1.5 g/ml or more;

d.3. In a liquid state at 273 K (0° C); *and*

d.4. Containing 60% or more by weight of fluorine.

TECHNICAL NOTE: For the purpose of 1C006:

a. Flash point is determined using the Cleveland Open Cup Method described in ASTM D–92 or national equivalents;

b. Pour point is determined using the method described in ASTM D–97 or national equivalents;

c. Viscosity index is determined using the method described in ASTM D–2270 or national equivalents;

d. Thermal stability is determined by the following test procedure or national equivalents:

Twenty ml of the fluid under test is placed in a 46 ml type 317 stainless steel chamber containing one each of 12.5 mm (nominal) diameter balls of M–10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn);

The chamber is purged with nitrogen, sealed at atmospheric pressure and the temperature raised to and maintained at 644 ± 6 K (371 ± 6° C) for six hours;

The specimen will be considered thermally stable if, on completion of the above procedure, all of the following conditions are met:

1. The loss in weight of each ball is less than 10 mg/mm2 of ball surface;

2. The change in original viscosity as determined at 311 K (38° C) is less than 25%; *and*

3. The total acid or base number is less than 0.40;

e. Autogenous ignition temperature is determined using the method described in ASTM E–659 or national equivalents.

1C007 Ceramic base materials, non-"composite" ceramic materials, ceramic-"matrix" "composite" materials and precursor materials, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2.
MT applies to items in 1C007.d and .f when the dielectric constant is less than 6 at frequencies from 100 Hz to 10,000 MHz for use in missile radomes.	MT Column 1.
AT applies to entire entry	AT Column 1.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000, except N/A for MT and for 1C007.e
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See also 1C107
Related Definitions: N/A
Items: a. Base materials of single or complex borides of titanium having total metallic impurities, excluding intentional additions, of less than 5,000 ppm, an average particle size equal to or less than 5 μm and no more than 10% of the particles larger than 10 μm;

b. Non-''composite'' ceramic materials in crude or semi-fabricated form, composed of borides of titanium with a density of 98% or more of the theoretical density;

NOTE: 1C007.b does not control abrasives.

c. Ceramic-ceramic ''composite'' materials with a glass or oxide-''matrix'' and reinforced with fibers made from any of the following systems:

c.1. Si-N;

c.2. Si-C;

c.3. Si-Al-O-N; *or*

c.4. Si-O-N; having a ''specific tensile strength'' exceeding 12.7×10^3 m;

d. Ceramic-ceramic ''composite'' materials, with or without a continuous metallic phase, incorporating particles, whiskers or fibers, where carbides or nitrides of silicon, zirconium or boron form the ''matrix'';

e. Precursor materials (i.e., special purpose polymeric or metallo-organic materials) for producing any phase or phases of the materials controlled by 1C007.c, as follows:

e.1. Polydiorganosilanes (for producing silicon carbide);

e.2. Polysilazanes (for producing silicon nitride);

e.3. Polycarbosilazanes (for producing ceramics with silicon, carbon and nitrogen components);

f. Ceramic-ceramic ''composite'' materials with an oxide or glass ''matrix'' reinforced with continuous fibers from any of the following systems:

f.1. Al_2O_3; *or*

f.2. Si-C-N.

NOTE: 1C007.f does not control ''composites'' containing fibers from these systems with a fiber tensile strength of less than 700 MPa at 1,273 K (1,000° C) or fiber tensile creep resistance of more than 1% creep strain at 100 MPa load and 1,273 K (1,000° C) for 100 hours.

1C008 Non-fluorinated polymeric substances, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $200
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Non-fluorinated polymeric substances, as follows:

a.1. Bismaleimides;

a.2. Aromatic polyamide-imides;

a.3. Aromatic polyimides;

a.4. Aromatic polyetherimides having a glass transition temperature (T_g) exceeding 513 K (240° C) determined using the dry method described in ASTM D 3418;

NOTE: 1C008.a does not control non-fusible compression molding powders or molded forms.

b. Thermoplastic liquid crystal copolymers having a heat distortion temperature exceeding 523 K (250° C) measured according to ASTM D–648, method A, or national equivalents, with a load of 1.82 N/mm² and composed of:

b.1. Any of the following:

b.1.a. Phenylene, biphenylene or naphthalene; or

b.1.b. Methyl, tertiary-butyl or phenyl substituted phenylene, biphenylene or naphthalene; *and*

b.2. Any of the following acids:

b.2.a. Terephthalic acid;

b.2.b. 6-hydroxy-2 naphthoic acid; *or*

b.2.c. 4-hydroxybenzoic acid;

c. Polyarylene ether ketones, as follows:

c.1. Polyether ether ketone (PEEK)

c.2. Polyether ketone ketone (PEKK);

c.3. Polyether ketone (PEK);

c.4. Polyether ketone ether ketone ketone (PEKEKK);

d. Polyarylene ketones;

e. Polyarylene sulphides, where the arylene group is biphenylene, triphenylene or combinations thereof;

f. Polybiphenylenethersulphone.

TECHNICAL NOTE: The glass transition temperature (T_g) for 1C008 materials is determined using the method described in ASTM D 3418 using the dry method.

1C009 Unprocessed fluorinated compounds, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Copolymers of vinylidene fluoride having 75% or more beta crystalline structure without stretching;

b. Fluorinated polyimides containing 10% by weight or more of combined fluorine;

c. Fluorinated phosphazene elastomers containing 30% by weight or more of combined fluorine.

1C010 "Fibrous or filamentary materials" which may be used in organic "matrix", metallic "matrix" or carbon "matrix" "composite" structures or laminates, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 1C010.a (aramid ''fibrous or filamentary materials'', .b (carbon ''fibrous and filamentary materials''), and e.1 for ''fibrous and filamentary materials'' that meet or exceed the control criteria of ECCN 1C210.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $1500, N/A for NP
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See also 1C210, 1C990, and 9A110 for material not controlled by 1C010.e, as defined by technical notes 1 or 2. Note that some items in 1C010.e are also controlled under 9A110
Related Definitions: (1) Specific modulus: Young's modulus in pascals, equivalent to N/m^2 divided by specific weight in N/m^3, measured at a temperature of (296±2) K ((23+2) C) and a relative humidity of (50±5)%. (2) Specific tensile strength: ultimate tensile strength in pascals, equivalent to N/m^2 divided by specific weight in N/m^3, measured at a temperature of (296±2) K ((23±2) C) and a relative humidity of (50±5)%
Items: a. Organic ''fibrous or filamentary materials'', having all of the following:

a.1. A specific modulus exceeding 12.7×10^6 m; *and*

a.2. A specific tensile strength exceeding 23.5×10^4 m;

NOTE: 1C010.a does not control polyethylene.

b. Carbon ''fibrous or filamentary materials'', having all of the following:

b.1. A specific modulus exceeding 12.7×10^6 m; *and*

b.2. A specific tensile strength exceeding 23.5×10^4 m;

TECHNICAL NOTE: Properties for materials described in 1C010.b should be determined using SACMA recommended methods SRM 12 to 17, or national equivalent tow tests, such as Japanese Industrial Standard JIS–R–7601, Paragraph 6.6.2, and based on lot average.

NOTE: 1C010.b does not control fabric made from ''fibrous or filamentary materials'' for the repair of aircraft structures or laminates, in which the size of individual sheets does not exceed 50 cm × 90 cm.

c. Inorganic ''fibrous or filamentary materials'', having all of the following:

c.1. A specific modulus exceeding 2.54×10^6 m; and

c.2. A melting, softening, decomposition or sublimation point exceeding 1,922 K (1,649 °C) in an inert environment;

NOTE: 1C010.c does not control:

1. Discontinuous, multiphase, polycrystalline alumina fibers in chopped fiber or random mat form, containing 3 weight percent or more silica, with a specific modulus of less than 10×10^6 m;

2. Molybdenum and molybdenum alloy fibers;

3. Boron fibers;

4. Discontinuous ceramic fibers with a melting, softening, decomposition or sublimation point lower than 2,043 K (1,770 °C) in an inert environment.

d. ''Fibrous or filamentary materials'':

d.1. Composed of any of the following:

d.1.a. Polyetherimides controlled by 1C008.a; *or*

d.1.b. Materials controlled by 1C008.b to 1C008.f; *or*

d.2. Composed of materials controlled by 1C010.d.1.a or 1C010.d.1.b and ''commingled'' with other fibers controlled by 1C010.a, 1C010.b or 1C010.c;

e. Resin-impregnated or pitch-impregnated fibers (prepregs), metal or carbon-coated fibers (preforms) or ''carbon fiber preforms'', as follows:

e.1. Made from ''fibrous or filamentary materials'' controlled by 1C010.a, 1C010.b or 1C010.c;

e.2. Made from organic or carbon ''fibrous or filamentary materials'':

e.2.a. With a ''specific tensile strength'' exceeding $17.7\text{x}10^4$ m;

e.2.b. With a ''specific modulus'' exceeding 10.15×10^6 m;

e.2.c. Not controlled by 1C010.a or 1C010.b; *and*

e.2.d. When impregnated with materials controlled by 1C008 or 1C009.b, having a glass transition temperature (T_g) exceeding 383 K (110 °C) or with phenolic or epoxy resins, having a glass transition temperature (T_g) equal to or exceeding 418 K (145 °C).

NOTES: 1C010.e does not control:

1. Epoxy resin ''matrix'' impregnated carbon ''fibrous or filamentary materials'' (prepregs) for the repair of aircraft structures or laminates, in which the size of individual sheets of prepreg does not exceed 50 cm × 90 cm;

2. Prepregs when impregnated with phenolic or epoxy resins having a glass transition temperature (T_g) less than 433 K (160 °C) and a cure temperature lower than the glass transition temperature.

TECHNICAL NOTE: The glass transition temperature (T_g) for 1C010.e materials is determined using the method described in ASTM D 3418 using the dry method. The glass transition temperature for phenolic and epoxy resins is determined using the method described in ASTM D 4065 at a frequency of 1 Hz and a heating rate of 2 K per minute using the dry method.

1C011 Metals and compounds, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to 1C011.a and .b	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) See also 1C111. (2) Items controlled by 1C011.a, and metal fuels in particle form, whether spherical, atomized, spheroidal, flaked or ground, manufactured from material consisting of 99 percent or more of items controlled by 1C011.b. are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121)

Related Definitions: N/A

Items: a. Metals in particle sizes of less than 60 μm whether spherical, atomized, spheroidal, flaked or ground, manufactured from material consisting of 99% or more of zirconium, magnesium and alloys of these;

N.B.: The metals or alloys listed in 1C011.a are controlled whether or not the metals or alloys are encapsulated in aluminum, magnesium, zirconium or beryllium.

b. Boron or boron carbide of 85% purity or higher and a particle size of 60 μm or less;

N.B.: The metals or alloys listed in 1C011.b are controlled whether or not the metals or alloys are encapsulated in aluminum, magnesium, zirconium or beryllium.

c. Guanidine nitrate.

1C012 Materials for nuclear heat sources, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:

Control(s): Items described in 1C012 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: a. Plutonium in any form with a plutonium isotopic assay of plutonium-238 of more than 50% by weight;

NOTE: 1C012.a does not control:

1. Shipments with a plutonium content of 1 g or less;

2. Shipments of 3 effective grams or less when contained in a sensing component in instruments.

b. Previously separated neptunium-237 in any form.

NOTE: 1C012.b does not control shipments with a neptunium-237 content of 1 g or less.

1C018 Materials on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $3000, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)

GBS: Yes for items listed in Advisory Note to 1C018, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: N/A

Related Definitions: N/A

Items: a. Ethyl and Methyl centralites.

b. NN-Diphenylurea (unsymmetrical diphenylurea).

c. Methyl-NN-diphenylurea (methyl unsymmetrical diphenylurea).

d. Ethyl-NN-diphenylurea (ethyl unsymmetrical diphenylurea).

e. Ethyl phenyl urethane.

f. Diphenyl urethane.

g. Diortho tolyl-urethane.

h. 2-Nitrodiphenylamine.

i. p-Nitromethylaniline.

j. 2,2 Dinitropropanol.

k. Bis(2,2 dinitropropyl) formal and acetal.

l. 3-Nitraza-1,5 pentane diisocyanate.

m. Guanidine nitrate.

n. Hydrogen peroxide in concentrations of 85%.

o. Charges specially designed for civilian applications, containing military explosives, except those items described in 1C992.

TECHNICAL NOTE: Military high explosives are solid, liquid or gaseous substances or mixtures of substances that, in their application as primary, booster, or main charges in warheads, demolition and other military applications, are required to detonate.

ADVISORY NOTE: Licenses are likely to be approved for export and reexport to satisfactory end-users in Country Group D:1 of certain explosive substances and mixtures in reasonable quantities for civilian or industrial purposes when made into cartridges or charges of an exclusively civilian or industrial nature, such as propellants for sporting purposes or shooting gallery practice; cartridges for riveting guns; and explosive charges for agricultural purposes, public works, mines, quarries or oil-well drilling. The following are the substances or mixtures to which this procedure applies:

a. Nitrate-based (40 percent or more) and provided they do not contain more than 40 percent nitroglycol/nitroglycerin or no more than 16 percent TNT;

b. Nitrocellulose with a nitrogen content of over 12.2 percent;

c. Nitroglycerin;

d. Single base nitrocellulose;

e. Sodium azide and other inorganic azides.

1C101 Materials and devices for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures, other than those controlled by 1C001, usable in "missiles" and their subsystems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: Materials controlled by this entry include: (a) structural materials and coatings specially designed for reduced radar reflectivity; (b) coatings, including paints, specially designed for reduced or tailored reflectivity or emissivity in the microwave, infrared or ultraviolet spectra. This entry does not control coatings when specially used for the thermal control of satellites.

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

1C107 Graphite and ceramic materials, other than those controlled by 1C007, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT.

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Fine grain recrystallized bulk graphites having a bulk density of 1.72 g/cm^3 or greater, measured at 288 K (15° C), and having a particle size of 100 micrometers or less, pyrolytic or fibrous reinforced graphites, usable for rocket nozzles and re-entry vehicle nose tips;

b. Ceramic composite materials (dielectric constant less than 6 at frequencies from 100 Hz to 10,000 MHz), also usable for ''missile'' radomes, and bulk machinable silicon-carbide reinforced unfired ceramic, usable for nose tips.

1C111 Propellants and constituent chemicals for propellants, other than those controlled by 1C011, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: The following materials, whether or not encapsulated in aluminum, beryllium, magnesium, or zirconium are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls: (See 22 CFR part 121): (a) Spherical aluminum powder with particles of uniform diameter 60×10^{-6} m (60 micrometers) or less and an aluminum content of 97 percent or greater; (b) Metals in particle sizes less than 60×10^{-6} m (60 microns), whether spherical, atomized, spheroidal, flaked or ground, manufactured from material consisting of 99 percent or more of: boron; magnesium; zirconium; alloys of boron, magnesium or zirconium; beryllium; or iron powder with average particle size of 3×10^{-6} m (3 microns) or less produced by hydrogen reduction of iron oxide.
Related Definitions: N/A
Items: a. Propulsive substances:

a.1. Spherical aluminum powder, other than that specified on the U.S. Munitions List, with particles of uniform diameter of less than 500 micrometer and an aluminum content of 97% by weight or greater;

a.2. Metals, other than that controlled by the U.S. Munitions List, in particle sizes of less than 500 micrometers, whether spherical, atomized, spheroidal, flaked or ground, consisting 97% or more by weight of any of the following:

a.2.a. Zirconium;
a.2.b. Beryllium;
a.2.c. Boron;
a.2.d. Magnesium; *or*
a.2.e. Alloys of the metals specified by a.2.a to a.2.d above;

a.3. Liquid oxidizers, the following:
a.3.a. Dinitrogen trioxide;
a.3.b. Nitrogen dioxide/dinitrogen tetroxide;
a.3.c. Dinitrogen pentoxide;

b. Polymeric substances:
b.1. Carboxy-terminated polybutadiene (CTPB);
b.2. Hydroxy-terminated polybutadiene (HTPB), other than that controlled by the U.S. Munitions List;
b.3. Polybutadiene-acrylic acid (PBAA);
b.4. Polybutadiene-acrylic acid-acrylonitrile (PBAN);

c. Other propellant additives and agents:
c.1. Butacene;
c.2. Triethylene glycol dinitrate (TEGDN);
c.3. 2-Nitrodiphenylamine;
c.4. Trimethylolethane trinitrate (TMETN);
c.5. Diethylene glycol dinitrate (DEGDN).

NOTE: For propellants and constituent chemicals for propellants not controlled by 1C111, see the U.S. Munitions List.

1C116 Maraging steels (steels generally characterized by high nickel, very low carbon content and the use of substitutional elements or precipitates to produce age-hardening) having an ultimate tensile strength of 1,500 MPa or greater, measured at 293 K (20° C), in the form of sheet, plate or tubing with a wall or plate thickness equal to or less than 5 mm.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to items that meet or exceed the parameters of 1C216.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 1C216
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C117 Tungsten, molybdenum and alloys of these metals in the form of uniform, spherical or atomized particles of 500 micrometer diameter or less with a purity of 97% or greater for fabrication of rocket motor components, i.e., heat shields, nozzle substrates, nozzle throats and thrust vector control surfaces.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C202 Alloys, other than those controlled by 1C002.a.2.c or .d, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: The phrase ''alloys capable of'' encompasses before and after heat treatment.
Items: a. Aluminum ''alloys capable of'' an ultimate tensile strength of 460 MPa or more at 293 K (20° C), in the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm;

b. Titanium ''alloys capable of'' an ultimate tensile strength of 900 MPa or more at 293 K (20° C) in the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm.

1C210 "Fibrous or filamentary materials" or prepregs, other than those controlled by 1C010.a, .b or .e, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See 9A110 for fiber prepregs.
Related Definitions: For the purpose of this entry, the term ''fibrous or filamentary materials'' is restricted to continuous ''monofilaments'', ''yarns'', ''rovings'', ''tows'' or ''tapes''.
Definitions for other terms used in this entry:
Filament or Monofilament is the smallest increment of fiber, usually several μm in diameter.
Strand is a bundle of filaments (typically over 200) arranged approximately parallel.
Roving is a bundle (typically 12–120) of approximately parallel strands.
Yarn is a bundle of twisted strands.
Tow is a bundle of filaments, usually approximately parallel.
Tape is a material constructed of interlaced or unidirectional filaments, strands, rovings, tows or yarns, etc., usually preimpregnated with resin.
Specific modulus is the Young's modulus in N/m^2 divided by the specific weight in N/m^3, measured at a temperature of 23 ± 2 °C and a relative humidity of 50 ± 5 percent.
Specific tensile strength is the ultimate tensile strength in N/m^2 divided by specific weight in N/m^3, measured at a temperature of 23 ± 2 °C and a relative humidity of 50 ± 5 percent.
Items: a. Carbon or aramid ''fibrous or filamentary materials'' having a ''specific modulus'' of 12.7×10^6 m or greater or a ''specific tensile strength'' of 235×10^3 m or greater *except* Aramid ''fibrous or filamentary materials'' having 0.25 percent or more by weight of an ester based fiber surface modifier;

b. Glass ''fibrous or filamentary materials'' having a ''specific modulus'' of 3.18×10^6 m or greater and a ''specific tensile strength'' of 76.2×10^3 m or greater; *or*

c. Thermoset resin impregnated continuous ''yarns'', ''rovings'', ''tows'' or ''tapes'' with a width no greater than 15 mm (prepregs), made from carbon or glass ''fibrous or filamentary materials'' controlled by 1C210.a or .b.

TECHNICAL NOTE: The resin forms the matrix of the composite.

1C216 Maraging steel, other than that controlled by 1C116, capable of an ultimate tensile strength of 2,050 MPa or more, at 293 K (20° C), except forms in which no linear dimension exceeds 75 mm.

LICENSE REQUIREMENTS

Reason for Control: NP, MT, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: The phrase ''maraging steel capable of'' encompasses maraging steel before or after heat treatment.
Items: The list of items controlled is contained in the ECCN heading.

1C225 Boron and boron compounds, mixtures and loaded materials in which the boron-10 isotope is more than 20% by weight of the total boron content.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C226 Parts made of tungsten, tungsten carbide, or tungsten alloys (greater than 90% tungsten) having a mass greater than 20 kg and a hollow cylindrical symmetry (including cylinder segments) with an inside diameter greater than 100 mm but less than 300 mm, except parts specially designed for use as weights or gamma-ray collimators.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C227 Calcium (high purity) containing both less than 1,000 parts per million by weight of metallic impurities other than magnesium and less than 10 parts per million of boron.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C228 Magnesium (high purity) containing both less than 200 parts per million by weight of metallic impurities other than calcium and less than 10 parts per million of boron.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C229 High purity (99.99% or greater) bismuth with very low silver content (less than 10 parts per million).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C230 Beryllium metal, alloys containing more than 50% of beryllium by weight, beryllium compounds, or manufactures thereof, including waste and scrap containing beryllium metal, alloys, or compounds.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: (1) This entry includes waste and scrap containing beryllium metal, alloys, or compounds. (2) This entry does not control: (a) Metal windows for X-ray machines, or for bore-hole logging devices; (b) Oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits; and, (c) Beryl (silicate of beryllium and aluminum) in the form of emeralds or aquamarines.
Related Definitions: N/A.
Items: The list of items controlled is contained in the ECCN heading.

1C231 Hafnium metal, alloys and compounds of hafnium containing more than 60% hafnium by weight and manufactures thereof.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controsl: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C232 Helium-3 or helium isotopically enriched in the helium-3 isotope, mixtures containing helium-3, or products or devices containing any of the foregoing, except a product or device containing less than 1 g of helium-3.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C233 Lithium enriched in the 6 isotope (^{6}Li) to greater than 7.5 atom percent, alloys, compounds or mixtures containing lithium enriched in the 6 isotope, or products or devices containing any of the foregoing except thermoluminescent dosimeters.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: The natural occurrence of the 6 isotope in lithium is 7.5 atom percent.
Items: The list of items controlled is contained in the ECCN heading.

1C234 Zirconium with a hafnium content of less than 1 part hafnium to 500 parts zirconium by weight, in the form of metal,

alloys containing more than 50% zirconium by weight, or compounds, or manufactures wholly thereof; except zirconium in the form of foil having a thickness not exceeding 0.10 mm.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: Zirconium metal and alloys in the form of tubes or assemblies of tubes, specially designed or prepared for use in a reactor are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.) This entry includes waste and scrap containing zirconium. This entry does not control zirconium in the form of foil or strip having a thickness not exceeding 0.10 mm (0.004 in.).
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C235 Tritium, tritium compounds, mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1000, or products or devices containing any of the foregoing; except, a product or device containing not more than 1.48×10^3 GBq (40 Ci) of tritium in any form.

LICENSE REQUIREMENTS

Reason for Control:
Control(s): Items described in 1C235 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C236 Alpha-emitting radionuclides having an alpha half-life of 10 days or greater but less than 200 years, compounds or mixtures containing any of these radionuclides with a total alpha activity of 37 GBq/kg (1 Ci/kg) or greater, or products or devices containing any of the foregoing, except a product or device containing less than 3.7 GBq (100 millicuries) of alpha activity.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Millicuries
Related Controls: Certain alpha emitting radionuclides are subject to the export licensing authority of the Nuclear Regulatory Commission. (See also 10 CFR part 110.)
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C237 Radium-226, radium-226 compounds, mixtures containing radium-226, or products or devices containing any of the foregoing, except medical applicators, or products or devices containing not more than 0.37 GBq (10 millicuries) of radium-226 in any form.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C238 Chlorine trifluoride (ClF_3).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C239 High explosives, other than those controlled by the U.S. Munitions List, or substances or mixtures containing more than 2% thereof, with a crystal density greater than 1.8 gm per cm^3 and having a detonation velocity greater than 8,000 m/s.

LICENSE REQUIREMENTS

Reason for Control:

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See also 22 CFR part 12
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C240 Nickel powder or porous nickel metal, other than those controlled by 0C006, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control:

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Powder with a nickel purity content of 99.0% by weight or greater and a mean particle size of less than 10 micrometers measured by American Society for Testing and Materials (ASTM) B330 standard, except filamentary nickel powders;

b. Porous nickel powder produced from materials controlled by 1C240.a, except single porous nickel sheets not exceeding 1,000 cm^2 per sheet.

NOTE: 1C240.b refers to porous metal formed by compacting and sintering the materials in 1C240.a to form a metal material with fine pores interconnected throughout the structure.

1C350 Chemicals that may be used as precursors for toxic chemical agents, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 2.
AT applies to entire entry	AT Column 1.

License Requirement Notes:

1. *SAMPLE SHIPMENTS:* Certain sample shipments of chemicals controlled under ECCN 1C350 may be made without a license, as provided by the following:

a. Chemicals Not Eligible: The following chemicals are *not* eligible for sample shipments: 0-Ethyl-2-diisopropylaminoethyl methylphosphonite (QL) (C.A.S. #57856–11–8), Ethylphosphonyl difluoride (C.A.S. #753–98–0), and Methylphosphonyl difluoride (C.A.S. #676–99–3).

b. Countries Not Eligible: The following countries are *not* eligible to receive sample shipments: Cuba, Iran, Iraq, Libya, North Korea, Sudan, Syria.

c. Sample Shipments: A license is not required for sample shipments when the cumulative total of these shipments does not exceed a 55-gallon container or 200 kg of each chemical to any one consignee per calendar year. Multiple sample shipments, in any quantity, not exceeding the cumulative totals indicated in this paragraph may be exported without a license, in accordance with the provisions of this Note 1. A consignee that receives a sample shipment under this exclusion may not resell, transfer or reexport the sample shipment, but may use the sample shipment for any other legal purpose unrelated to chemical weapons. However, a sample shipment received under this exclusion remains subject to all General Prohibitions including the end-use restriction described in §744.4 of the EAR.

d. The exporter is required to submit a quarterly written report for shipments of samples made under this Note 1. The report must be on company letterhead stationery (titled ''Report of Sample Shipments of Chemical Precursors'' at the top of the first page) and identify the chemical(s), Chemical Abstract Service Registry (C.A.S.) number(s), quantity(ies), the ultimate consignee's name and address, and the date exported. The report must be sent to the U.S. Department of Commerce, Bureau of Export Administration, P.O. Box 273, Washington, DC 20044, Attn: ''Report of Sample Shipments of Chemical Precursors''.

2. *MIXTURES:* Mixtures controlled by this entry that contain certain concentrations of precursor and intermediate chemicals are

subject to the following licensing requirements:

a. A license is required, regardless of the concentrations in the mixture, for the following chemicals: 0-Ethyl-2-diisopropylaminoethyl methylphosphonite (QL) (C.A.S.ι57856–11–8), Ethylphosphonyl difluoride (C.A.S.ι753–98–0) and Methylphosphonyl difluoride (C.A.S.ι676–99–3);

b. A license is required when at least one of the following chemicals constitutes more than 10 percent of the weight of the mixture: Arsenic trichloride (C.A.S.#7784–34–1), Benzilic acid (C.A.S.#76–93–7), Diethyl ethylphosphonate (C.A.S.#78–38–6), Diethyl methylphosphonite (C.A.S.#15715–41–0), Diethyl-N,N-dimethylphosphoroamidate (C.A.S.#2404–03–7), N,N-Diisopropyl-beta-aminoethane thiol (C.A.S.#5842–07–9), N,N-Diisopropyl-2-aminoethyl chloride hydrochloride (C.A.S.#4261–68–1), N,N-Diisopropyl-beta-aminoethanol (C.A.S.#96–80–0), N,N-Diisopropyl-beta-aminoethyl chloride (C.A.S.#96–79–7), Dimethyl ethylphosphonate (C.A.S.#6163–75–3), Dimethyl methylphosphonate (C.A.S.#756–79–6), Ethylphosphonous dichloride [Ethylphosphinyl dichloride] (C.A.S.#1498–40–4), Ethylphosphonus difluoride [Ethylphosphinyl difluoride] (C.A.S.#430–78–4), Ethylphosphonyl dichloride (C.A.S.#1066–50–8), Methylphosphonous dichloride [Methylphosphinyl dicloride] (C.A.S.#676–83–5), Methylphosphonous difluoride [Methylphosphinyl difluoride] (C.A.S.#753–59–3), Methylphosphonyl dichloride (C.A.S.#676–97–1), Pinacolyl alcohol (C.A.S.#464–07–3), 3-Quinuclidinol (C.A.S.#1619–34–7), and Thiodiglycol (C.A.S.#111–48–8) (Related ECCN: 1C995);

c. A license is required when at least one of all other chemicals in the List of Items Controlled constitutes more than 25 percent of the weight of the mixture(related ECCN: 1C995); and

d. A license is not required under this entry for mixtures when the controlled chemical is a normal ingredient in consumer goods packaged for retail sale for personal use. Such consumer goods are controlled by ECCN EAR99.

NOTE TO MIXTURES: Calculation of concentrations of AG-controlled chemicals:

a. Exclusion. No chemical may be added to the mixture (solution) for the sole purpose of circumventing the Export Administration Regulations;

b. Absolute Weight Calculation. When calculating the percentage, by weight, of components in a chemical mixture, include all components of the mixture, including those that act as solvents;

c. Example.

11% chemical listed in paragraph b. of Note 2
39% chemical not listed in Note 2
50% Solvent
100% Mixture
11/100 = 11% chemical listed in paragraph b. of Note 2.

In this example, a license is required because a chemical listed in paragraph b. of Note 2 constitutes more than 10 percent of the weight of the mixture.

3. *COMPOUNDS:* A license is not required under this entry for chemical compounds created with any chemicals identified in this ECCN 1C350, unless those compounds are also identified in this entry.

Technical Notes: 1. For purposes of this entry, a ''mixture'' is defined as a solid, liquid or gaseous product made up of two or more components that do not react together under normal storage conditions.

2. The scope of this control applicable to Hydrogen Fluoride (Item 25 in List of Items Controlled) includes its liquid, gaseous, and aqueous phases, and hydrates.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Liters or kilograms, as appropriate
Related Controls: See also 1C995
Related Definition: See §770.2(k) of the EAR for synonyms for the chemicals listed in this entry.
Items: a. Precursor Chemicals, as follows:

a.1. (C.A.S. #1341–49–7) Ammonium hydrogen fluoride;

a.2. (C.A.S. #7784–34–1) Arsenic trichloride;

a.3. (C.A.S. #76–93–7) Benzilic acid;

a.4. (C.A.S. #107–07–3) 2-Chloroethanol;

a.5. (C.A.S. #78–38–6) Diethyl ethylphosphonate;

a.6. (C.A.S. #15715–41–0) Diethyl methylphosphonite;

a.7. (C.A.S. #2404–03–7) Diethyl-N,N-dimethylphosphoroamidate;

a.8. (C.A.S. #762–04–9) Diethyl phosphite;

a.9. (C.A.S. #100–37–8) N,N-Diethylaminoethanol;

a.10. (C.A.S. #5842–07–9) N,N-Diisopropyl-beta-aminoethane thiol;

a.11. (C.A.S. #4261–68–1) N,N-Diisopropyl-beta-aminoethyl chloride hydrochloride;

a.12. (C.A.S. #96–80–0) N,N-Diisopropyl-beta-aminoethanol;

a.13. (C.A.S. #96–79–7), N,N-Diisopropyl-beta-aminoethyl chloride;

a.14. (C.A.S. #108–18–9) Di-isopropylamine;

a.15. (C.A.S. #6163–75–3) Dimethyl ethylphosphonate;

a.16. (C.A.S. #756–79–6) Dimethyl methylphosphonate;

a.17. (C.A.S. #868–85–9) Dimethyl phosphite (dimethyl hydrogen phosphite);

a.18. (C.A.S. #124–40–3) Dimethylamine;

a.19. (C.A.S. #506–59–2) Dimethylamine hydrochloride;

a.20. (C.A.S. #57856–11–8) 0-Ethyl-2-diisopropylaminoethyl methyl phosphonite (QL);
a.21. (C.A.S. #1498–40–4) Ethyl phosphonous dichloride [Ethyl phosphinyl dichloride];
a.22. (C.A.S. #430–78–4) Ethyl phosphonus difluoride [Ethyl phosphinyl difluoride];
a.23. (C.A.S. #1066–50–8) Ethyl phosphonyl dichloride;
a.24. (C.A.S. #753–98–0) Ethyl phosphonyl difluoride;
a.25. (C.A.S. #7664–39–3) Hydrogen fluoride;
a.26. (C.A.S. #3554–74–3) 3-Hydroxyl-1-methylpiperidine;
a.27. (C.A.S. #76–89–1) Methyl benzilate;
a.28. (C.A.S. #676–83–5) Methyl phosphonous dichloride [Methyl phosphinyl dicloride];
a.29. (C.A.S. #753–59–3) Methyl phosphonous difluoride [Methyl phosphinyl difluoride];
a.30. (C.A.S. #676–97–1) Methyl phosphonyl dichloride;
a.31. (C.A.S. #676–99–3) Methyl phosphonyl difluoride;
a.32. (C.A.S. #10025–87–3) Phosphorus oxychloride;
a.33. (C.A.S. #10026–13–8) Phosphorus pentachloride;
a.34. (C.A.S. #1314–80–3) Phosphorus pentasulfide;
a.35. (C.A.S. #7719–12–2) Phosphorus trichloride;
a.36. (C.A.S. #75–97–8) Pinacolone;
a.37. (C.A.S. #464–07–3) Pinacolyl alcohol;
a.38. (C.A.S. #151–50–8) Potassium cyanide;
a.39. (C.A.S. #7789–23–3) Potassium fluoride;
a.40. (C.A.S. #7789–29–9) Potassium bifluoride;
a.41. (C.A.S. #1619–34–7) 3-Quinuclidinol;
a.42. (C.A.S. #3731–38–2) 3-Quinuclidone;
a.43. (C.A.S. #1333–83–1) Sodium bifluoride;
a.44. (C.A.S. #143–33–9) Sodium cyanide;
a.45. (C.A.S. #7681–49–4) Sodium fluoride;
a.46. (C.A.S. #1313–82–2) Sodium sulfide;
a.47. (C.A.S. #10025–67–9) Sulfur monochloride;
a.48. (C.A.S. #10545–99–0) Sulfur dichloride;
a.49. (C.A.S. #111–48–8) Thiodiglycol;
a.50. (C.A.S. #7719–09–7) Thionyl chloride;
a.51. (C.A.S. #102–71–6) Triethanolamine;
a.52. (C.A.S. #637–39–8) Triethanolamine hydrochloride;
a.53. (C.A.S. #122–52–1) Triethyl phosphite; *and*
a.54. (C.A.S. #121–45–9) Trimethyl phosphite.
b. Reserved.

1C351 Human pathogens, zoonoses, and "toxins", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines and ''immunotoxins'' are excluded from the scope of this entry. See also 1C991.
Related Definition: (1) For the purposes of this entry ''immunotoxin'' is defined as an antibody-toxin conjugate intended to destroy specific target cells (e.g., tumor cells) that bear antigens homologous to the antibody. (2) For the purposes of this entry ''subunit'' is defined as a portion of the ''toxin''.
Items: a. Viruses, as follows:
a.1. Chikungunya virus;
a.2. Congo-Crimean haemorrhagic fever virus;
a.3. Dengue fever virus;
a.4. Eastern equine encephalitis virus;
a.5. Ebola virus;
a.6. Hantaan virus;
a.7. Japanese encephalitis virus;
a.8. Junin virus;
a.9. Lassa fever virus
a.10. Lymphocytic choriomeningitis virus;
a.11. Machupo virus;
a.12. Marburg virus;
a.13. Monkey pox virus;
a.14. Rift Valley fever virus;
a.15. Tick-borne encephalitis virus (Russian Spring-Summer encephalitis virus);
a.16. Variola virus;
a.17. Venezuelan equine encephalitis virus;
a.18. Western equine encephalitis virus;
a.19. White pox; *or*
a.20. Yellow fever virus.
b. Rickettsiae, as follows:
b.1. Bartonella quintana (Rochalimea quintana, Rickettsia quintana);
b.2. Coxiella burnetii;
b.3. Rickettsia prowasecki; *or*
b.4. Rickettsia rickettsii.
c. Bacteria, as follows:
c.1. Bacillus anthracis;
c.2. Brucella abortus;
c.3. Brucella melitensis;
c.4. Brucella suis;
c.5. Burkholderia mallei (Pseudomonas mallei);
c.6. Burkholderia pseudomallei (Pseudomonas pseudomallei);
c.7. Chlamydia psittaci;
c.8. Clostridium botulinum;
c.9. Francisella tularensis;
c.10. Salmonella typhi;
c.11. Shigella dysenteriae;
c.12. Vibrio cholerae;
c.13. Yersinia pestis.
d. ''Toxins'', as follows: and subunits thereof:
d.1. Botulinum toxins;
d.2. Clostridium perfringens toxins;

d.3. Conotoxin;
d.4. Microcystin (cyanginosin);
d.5. Ricin;
d.6. Saxitoxin;
d.7. Shiga toxin;
d.8. Staphylococcus aureus toxins;
d.9. Tetrodotoxin;
d.10. Verotoxin; *or*
d.11. Aflatoxins.

1C352 Animal pathogens, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines are excluded from the scope of this entry. See also 1C991.
Related Definition: N/A
Items: a. Viruses, as follows:

a.1. African swine fever virus;
a.2. Avian influenza virus that are:
a.2.a. Defined in EC Directive 92/40/EC (O.J. L.16 23.1.92 p.19) as having high pathogenicity, as follows:
a.2.a.1. Type A viruses with an IVPI (intravenous pathogenicity index) in 6 week old chickens of greater than 1.2; *or*
a.2.a.2. Type A viruses H5 or H7 subtype for which nucleotide sequencing has demonstrated multiple basic amino acids at the cleavage site of haemagglutinin;
a.3. Bluetongue virus;
a.4. Foot and mouth disease virus;
a.5. Goat pox virus;
a.6. Porcine herpes virus (Aujeszky's disease);
a.7. Swine fever virus (Hog cholera virus);
a.8. Lyssa virus;
a.9. Newcastle disease virus;
a.10. Peste des petits ruminants virus;
a.11. Porcine enterovirus type 9 (swine vesicular disease virus);
a.12. Rinderpest virus;
a.13. Sheep pox virus;
a.14. Teschen disease virus;
a.15. Vesicular stomatitis virus;
b. Bacteria, as follows:
b.1. Mycoplasma mycoides.
b.2. Reserved.

1C353 Genetically-modified "microorganisms", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines are excluded from the scope of this entry. See also 1C991
Related Definition: N/A
Items: a. Genetically modified ''microorganisms'' or genetic elements that contain nucleic acid sequences associated with pathogenicity of organisms controlled by 1C351.a to .c or 1C352 or 1C354;

b. Genetically modified ''microorganisms'' or genetic elements that contain nucleic acid sequences coding for any of the ''toxins'' controlled by 1C351.d or ''sub-units of toxins'' thereof.

1C354 Plant pathogens, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines are excluded from the scope of this entry. See also 1C991
Related Definitions: N/A
Items: a. Bacteria, as follows:

a.1. Xanthomonas albilineans;
a.2. Xanthomonas campestris pv. citri including strains referred to as Xanthomonas campestris pv. citri types A,B,C,D,E or otherwise classified as Xanthomonas citri, Xanthomonas campestris pv. aurantifolia or Xanthomonas campestris pv. citrumelo;
b. Fungi, as follows:
b.1. Colletotrichum coffeanum var. virulans (Colletotrichum kahawae);
b.2. Cochliobolus miyabeanus (Helminthosporium oryzae);
b.3. Microcyclus ulei (syn. Dothidella ulei);
b.4. Puccinia graminis (syn. Puccinia graminis f. sp. tritici);
b.5. Puccinia striiformis (syn. Puccinia glumarum);
b.6. Magnaporthe grisea (pyricularia grisea/pyricularia oryzae).

1C980 Inorganic chemicals listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons

LIST OF ITEMS CONTROLLED

Unit: Barrels/Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C981 Crude petroleum including reconstituted crude petroleum, tar sands & crude shale oil listed in Supplement No. 1 to part 754 of the EAR.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons

LIST OF ITEMS CONTROLLED

Unit: Barrels/Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1C982 Other petroleum products listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1C983 Natural gas liquids and other natural gas derivatives listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: Barrels/Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1C984 Manufactured gas and synthetic natural gas (except when commingled with natural gas and thus subject to export authorization from the Department of Energy) listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons

LIST OF ITEMS CONTROLLED

Unit: Millions of cubic feet
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1C988 Western red cedar (thuja plicata), logs and timber, and rough, dressed and worked lumber containing wane listed in Supplement No. 2 to part 754 of the EAR.

LICENSE REQUIREMENTS

Reason for Control: SS

Control(s): SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is

not designed to determine licensing requirements for items controlled for SS reasons

LIST OF ITEMS CONTROLLED

Unit: Million board feet scribner
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1C990 Fibrous and filamentary materials, not controlled by 1C010 or 1C210, for use in "composite" structures and with a specific modulus of 3.18×10^6 m or greater and a specific tensile strength of 7.62×10^4 m or greater.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1C991 Vaccines containing items controlled by ECCNs 1C351, 1C352, 1C353, and 1C354; and immunotoxins.

LICENSE REQUIREMENTS

Reason for Control: AT

AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: For the purpose of this entry ''immunotoxin'' is defined as an antibody-toxin conjugate intended to destroy specific target cells (e.g., tumor cells) that bear antigens homologous to the antibody
Items: The list of items controlled is contained in the ECCN heading

1C992 Oil well perforators.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Materials in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Shaped charges specially designed for oil well operations, utilizing one charge functioning along a single axis, that upon detonation produce a hole, and:

a.1. Contain any formulation of RDX, PYX, PETN, HNS, or HMX; *and*

a.2. Have only a uniformly shaped conical liner with an included angle of 90 degrees or less; *and*

a.3. Have a total explosive mass of no more than 90 grams; *and*

a.4. Have a diameter not exceeding three inches.

b. Reserved.

1C995 Mixtures containing precursor and intermediate chemicals used in the "production" of chemical warfare agents that are not controlled by ECCN 1C350.

LICENSE REQUIREMENTS

Reason for Control: AT

AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definition: For calculation of *de minimis* quantities of controlled chemicals in mixtures, see the License Requirements Notes 2 and 3 under ECCN 1C350 and §770.4 of the EAR
Items: The list of items controlled is contained in the ECCN heading

1C998 Detonation cords and equipment and explosive material (n.e.s).

LICENSE REQUIREMENTS

Reason for Control: UN

Control(s)	*Country Chart*
UN applies to entire entry	Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: Items contained in this entry are those materials other than materials subject to the licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121) and ECCN 1C018.
Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

1D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 1B001 to 1B003.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for the ''development'', ''production'', or ''use'' of items controlled by 1B001 for MT reasons.	MT Column 1
NP applies to ''software'' for the ''development'', ''production'' or ''use'' of items controlled by 1B001 for NP reasons.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: Yes, except N/A for MT
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 1D101 and 1D102
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D002 "Software" for the "development" of organic "matrix", metal "matrix" or carbon "matrix" laminates or "composites".

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' specially designed or modified for the ''development'' of ''composites'' controlled by 1A, 1B or 1C entries for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under Exceptions.

LICENSE EXCEPTIONS

CIV: Yes, except N/A for MT
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: ''Software'' for items controlled by 1A102 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D018 "Software" specially designed or modified for the "development", "production", or "use" of items controlled by 1B018.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
MT applies to ''software'' for the ''development'', ''production'', or ''use'' of items controlled by 1B018 for MT reasons.	MT Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D101 "Software" specially designed for the "use" of goods controlled by 1B101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D102 Other "software" not controlled by 1D001, 1D002, and 1D103, specially designed for the "development", "production" or "use" of items controlled by 1A, 1B, and 1C for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D103 "Software" specially designed for analysis of reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D201 "Software" specially designed for the "use" of goods controlled by 1B201.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D390 "Software" for process control that is specifically configured to control or initiate "production" of chemicals controlled by 1C350.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

1D993 "Software" specially designed for the "development", "production", or "use" of equipment or materials controlled by 1C210.b, 1C990, or 1C994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

E. TECHNOLOGY

1E001 "Technology" according to the General Technology Note for the "development" or "production" of items controlled by 1A001.b, 1A001.c, 1A002, 1A003, 1A004, 1A005, 1A102, 1B or 1C (except 1C980 to 1C984, 1C988, 1C990, 1C991, 1C992, 1C994 and 1C995).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, CB, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 1A001.b and .c, 1A002, 1A003, 1B001 to 1B003, 1B018, 1B225, 1C001 to 1C010, 1C018, 1C230, 1C231, 1C233, or 1C234.	NS Column 1
MT applies to ''technology'' 1 for items controlled by 1B001, 1B101, 1B115, 1B116, 1C001, 1C007, 1C101, 1C107, 1C011, 1C111, 1C116, or 1C117 for MT reasons.	MT Column 1
NP applies to ''technology'' for items controlled by 1A002, 1B001, 1B101, 1B201, 1B225 to 1B232, 1C001, 1C010, 1C202, 1C210, 1C216, 1C225 to 1C234, 1C236 to 1C238 for NP reasons.	NP Column 1
CB applies to ''technology'' for items controlled by 1C351, 1C352, 1C353, or 1C354.	CB Column 1
CB applies to ''technology'' for materials controlled by 1C350.	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except for MT and for exports and reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' for items controlled by 1C001 or 1C012; or 1A002.a, having an organic ''matrix'' and made from materials listed under 1C010.c or 1C010.d.

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) See also 1E101 and 1E210. (2) ''Technology'' for items controlled by 1C235 are subject to the export licensing authority of the Department of Energy (see 10 CFR part 810). (3) ''Technology'' for items described in 1C012 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). (4) ''Technology'' for items controlled by 1A102 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

1E002 Other ''technology'', as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to 1E002.e	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except for 1E002.e

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: See also 1E102, 1E202, and 1E101 for ''technology'' related to 1E002.e

Related Definitions: N/A

Items: a. ''Technology'' for the ''development'' or ''production'' of polybenzothiazoles or polybenzoxazoles;

b. ''Technology'' for the ''development'' or ''production'' of fluoroelastomer compounds containing at least one vinylether monomer;

c. ''Technology'' for the design or ''production'' of the following base materials or non-''composite'' ceramic materials:

c.1. Base materials having all of the following characteristics:

c.1.a. Any of the following compositions:

c.1.a.1. Single or complex oxides of zirconium and complex oxides of silicon or aluminum;

c.1.a.2. Single nitrides of boron (cubic crystalline forms);

c.1.a.3. Single or complex carbides of silicon or boron; *or*

c.1.a.4. Single or complex nitrides of silicon;

c.1.b. Total metallic impurities, excluding intentional additions, of less than:

c.1.b.1. 1,000 ppm for single oxides or carbides; *or*

c.1.b.2. 5,000 ppm for complex compounds or single nitrides; *and*

c.1.c. Having any of the following:

c.1.c.1. Average particle size equal to or less than 5 μm and no more than 10% of the particles larger than 10 μm; *or*

NOTE: For zirconia, these limits are 1 μm and 5 μm respectively.

c.1.c.2. Having all of the following:

c.1.c.2.a. Platelets with a length to thickness ratio exceeding 5;

c.1.c.2.b. Whiskers with a length to diameter ratio exceeding 10 for diameters less than 2 μm; *and*

c.1.c.2.c. Continuous or chopped fibers less than 10 μm in diameter;

c.2. Non-''composite'' ceramic materials composed of the materials described in 1E002.c.1;

NOTE: 1E002.c.2 does not control technology for the design or production of abrasives.

d. ''Technology'' for the ''production'' of aromatic polyamide fibers;

e. ''Technology'' for the installation, maintenance or repair of materials controlled by 1C001;

f. ''Technology'' for the repair of ''composite'' structures, laminates or materials controlled by 1A002, 1C007.c or 1C007.d.

NOTE: 1E002.f does not control ''technology'' for the repair of ''civil aircraft'' structures using carbon ''fibrous or filamentary materials'' and epoxy resins, contained in aircraft manufacturers' manuals.

1E101 "Technology" according to the General Technology Note for the "use" of goods controlled by 1A102, 1B001, 1B101, 1B115, 1B116, 1C001, 1C007, 1C011, 1C101, 1C107, 1C111, 1C116, 1C117, 1D101 or 1D103.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 1B001.a and 1B101	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: ''Technology'' for items controlled by 1A102 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E102 "Technology" according to the General Technology Note for the "development" of "software" controlled by 1D001, 1D101 or 1D103.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E103 "Technical data" (including processing conditions) for the regulation of temperature, pressure or atmosphere in autoclaves or hydroclaves, when used for the "production" of "composites" or partially processed "composites".

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 1E203
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E104 "Technology" relating to the "production" of pyrolitically derived materials formed on a mold, mandrel or other substrate from precursor gases which decompose in the 1,573 K (1,300° C) to 3,173 K (2,900° C) temperature range at pressures of 130 Pa to 20 kPa.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: This entry includes ''technology'' for the composition of precursor gases, flow-rates and process control schedules and parameters.
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E201 "Technology" according to the General Technology Note for the "use" of goods controlled by 1A002, 1A202, 1A225 to 1A227, 1B201, 1B225 to 1B233, 1C002.a.2.c or .d, 1C010.b, 1C202, 1C210, 1C216, 1C225 to 1C240 or 1D201.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E202 "Technology" according to the General Technology Note for the "development" or "production" of goods controlled by 1A202 or 1A225 to 1A227.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E203 "Technology" according to the General Technology Note for the "development" of "software" controlled by 1D201.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E350 "Technology" according to the "General Technology Note" for facilities designed or intended to produce chemicals controlled by 1C350.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E351 "Technology" according to the "General Technology Note" for the disposal of chemicals or microbiological materials controlled by 1C350, 1C351, 1C352, 1C353, or 1C354.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to ''technology'' for the disposal of items controlled by 1C351, 1C352, 1C353, or 1C354.	CB Column 1
CB applies to ''technology'' for the disposal of items controlled by 1C350.	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E994 "Technology" for the "development", "production", or "use" of fibrous and filamentary materials controlled by 1C990 or fluorocarbon electronic cooling fluids controlled by 1C994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere controlled by this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 2—Materials Processing

NOTE: For quiet running bearings, see the U.S. Munitions List.

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

2A001 Anti-friction bearings and bearing systems, as follows, (see List of Items Controlled) and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes, for 2A001.a and 2A001.b
CIV: Yes, for 2A001.a and 2A001.b

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 2A991. (2) This entry does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse. (3) Quiet running bearings are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: Annular Bearing Engineers Committee (ABEC).
Items: a. Ball bearings and solid roller bearings having tolerances specified by the manufacturer in accordance with ABEC 7, ABEC 7P, ABEC 7T or ISO Standard Class 4 or better (or national equivalents), and having rings, balls or rollers made from monel or beryllium;

NOTE: 2A001.a does not control tapered roller bearings.

b. Other ball bearings and solid roller bearings having tolerances specified by the manufacturer in accordance with ABEC 9, ABEC 9P or ISO Standard Class 2 or better (or national equivalents);

NOTE: 2A001.b does not control tapered roller bearings.

c. Active magnetic bearing systems using any of the following:
c.1. Materials with flux densities of 2.0 T or greater and yield strengths greater than 414 MPa;
c.2. All-electromagnetic 3D homopolar bias designs for actuators; *or*
c.3. High temperature (450 K (177 °C) and above) position sensors.

2A225 Crucibles made of materials resistant to liquid actinide metals, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Crucibles with a volume of between 150 ml and 8 liters and made of or coated with any of the following materials having a purity of 98% or greater:
a.1. Calcium fluoride (CaF_2);
a.2. Calcium zirconate (metazirconate) (Ca_2ZrO_3);
a.3. Cerium sulphide (Ce_2S_3);
a.4. Erbium oxide (erbia) (Er_2O_3);
a.5. Hafnium oxide (hafnia) (HfO_2);
a.6. Magnesium oxide (MgO);
a.7. Nitrided niobium-titanium-tungsten alloy (approximately 50% Nb, 30% Ti, 20% W);
a.8. Yttrium oxide (yttria) (Y_2O_3); *or*
a.9. Zirconium oxide (zirconia) (ZrO_2);
b. Crucibles with a volume of between 50 ml and 2 liters and made of or lined with tantalum, having a purity of 99.9% or greater;
c. Crucibles with a volume of between 50 ml and 2 liters and made of or lined with tantalum (having a purity of 98% or greater) coated with tantalum carbide, nitride or boride (or any combination of these).

2A226 Valves 5 mm or greater in "nominal size", with a bellows seal, wholly made of or lined with aluminum, aluminum alloy, nickel, or alloy containing 60% or more nickel, either manually or automatically operated.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Valves are also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definition: For valves with different inlet and outlet diameter, the ''nominal size'' parameter described in the entry refers to the smallest diameter.
Items: The list of items controlled is contained in the ECCN heading.

2A290 Generators and other equipment specially designed, prepared, or intended for use with nuclear plants.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items:

a. Generators, turbine-generator sets, steam turbines, heat exchangers, and heat exchanger type condensers designed or intended for use in a nuclear reactor;

b. Process control systems intended for use with the equipment controlled by 2A290.a.

2A291 Equipment related to nuclear material handling and processing and to nuclear reactors.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Process control systems, except those controlled by 2A290.b, intended for use with nuclear reactors.

b. Casks that are specially designed for transportation of high-level radioactive material and that weigh more than 1,000 kg.

c. Commodities, parts and accessories specially designed or prepared for use with nuclear plants (e.g., snubbers, airlocks, reactor and fuel inspection equipment) except items licensed by the Nuclear Regulatory Commission, pursuant to 10 CFR part 110.

2A292 Piping, fittings and valves made of, or lined with, stainless steel, copper-nickel alloy or other alloy steel containing 10% or more nickel and/or chromium.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Pressure tubes, pipes, and fittings in kilograms; valves in number; parts and accessories in $ value
Related Controls: Piping, fittings, and valves are also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Pressure tube, pipe, and fittings of 200 mm (8 inches) or more inside diameter, and suitable for operation at pressures of 3.4 MPa (500 psi) or greater;

b. Pipe valves having all of the following characteristics:

b.1. A pipe size connection of 8 inches or more inside diameter;

b.2. Rated at 1,500 psi or more;

c. Parts, n.e.s.

2A293 Pumps designed to move molten metals by electromagnetic forces.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

A991 Bearings and bearing systems not controlled by 2A001.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) This entry does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse. (2) Quiet running bearings are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls. (See 22 CFR part 121)
Related Definitions: (1) (a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation. (2) Annular Bearing Engineers Committee (ABEC); American National Standards Institute (ANSI); Anti-Friction Bearing Manufacturers Association (AFBMA)
Items: a. Ball bearings or Solid ball bearings (except tapered roller bearings), having tolerances specified by the manufacturer in accordance with ABEC 7, ABEC 7P, or ABEC 7T or ISO Standard Class 4 or better (or equivalents) and having any of the following characteristics.

a.1. Manufactured for use at operating temperatures above 573 K (300° C) either by using special materials or by special heat treatment; *or*

a.2. With lubricating elements or component modifications that, according to the manufacturer's specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN.

b. Solid tapered roller bearings, having tolerances specified by the manufacturer in accordance with ANSI/AFBMA Class 00 (inch) or Class A (metric) or better (or equivalents) and having either of the following characteristics.

b.1. With lubricating elements or component modifications that, according to the manufacturer's specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN; *or*

b.2. Manufactured for use at operating temperatures below 219 K (−54° C) or above 423 K (150° C).

c. Gas-lubricated foil bearing manufactured for use at operating temperatures of 561 K (288° C) or higher and a unit load capacity exceeding 1 MPa.

d. Active magnetic bearing systems.

e. Fabric-lined self-aligning or fabric-lined journal sliding bearings manufactured for use at operating temperatures below 219 K (−54° C) or above 423 K (150° C).

2A993 Explosive detection systems, consisting of an automated device, or combination of devices, with the ability to detect the presence of different types of explosives, in passenger checked baggage, without need for human skill, vigilance, or judgment.

LICENSE REQUIREMENTS

Reason for Control: AT, UN

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

2A994 Portable electric generators and specially designed parts.

LICENSE REQUIREMENTS

Reason for Control: AT
Control(s): AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya, and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information

NOTE: Exports from the U.S. and transshipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §742.8 and §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

NOTES FOR CATEGORY 2B: 1. Secondary parallel contouring axes (e.g., the w-axis on horizontal boring mills or a secondary rotary axis the center line of which is parallel to the primary rotary axis) are not counted in the total number of contouring axes.

N.B. Rotary axes need not rotate over 360°. A rotary axis can be driven by a linear device (e.g., a screw or a rack-and-pinion).

2. Axis nomenclature shall be in accordance with International Standard ISO 841, ''Numerical Control Machines—Axis and Motion Nomenclature''.

3. For the purposes of 2B001 to 2B009 a ''tilting spindle'' is counted as a rotary axis.

4. Guaranteed positioning accuracy levels instead of individual test protocols may be used for each machine tool model using the agreed ISO test procedure.

5. The positioning accuracy of ''numerically controlled'' machine tools is to be determined and presented in accordance with ISO 230/2.

2B001 Machine tools and any combination thereof, for removing (or cutting) metals, ceramics or "composites", which, according to the manufacturer's technical specification, can be equipped with electronic devices for "numerical control".

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 2B001.a,b,c, and d, EXCEPT: (1) turning machines under 2B001.a with a capacity equal to or less than 35 mm diameter; (2) bar machines (Swissturn), limited to machining only bar feed through, if maximum bar diameter is equal to or less than 42 mm and there is no capability of mounting chucks. (Machines may have drilling and/or milling capabilities for machining parts with diameters less than 42 mm); or (3) milling machines under 2B001.b. with x-axis travel greater than two meters and overall ''positioning accuracy'' on the x-axis more (worse) than 0.030 mm.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 2B290 and 2B991
Related Definitions: N/A
Items: a. Machine tools for turning, having all of the following characteristics:

a.1. Positioning accuracy with all compensations available of less (better) than 6 µm along any linear axis (overall positioning); *and*

a.2. Two or more axes which can be coordinated simultaneously for ''contouring control'';

NOTE: 2B001.a does not control turning machines specially designed for the production of contact lenses.

b. Machine tools for milling, having any of the following characteristics:

b.1.a. Positioning accuracy with all compensations available of less (better) than 6 µm along any linear axis (overall positioning); *and*

b.1.b. Three linear axes plus one rotary axis which can be coordinated simultaneously for ''contouring control'';

b.2. Five or more axes which can be coordinated simultaneously for ''contouring control''; *or*

b.3. A positioning accuracy for jig boring machines, with all compensations available, of less (better) than 4 µm along any linear axis (overall positioning);

c. Machine tools for grinding, having any of the following characteristics:

c.1.a. Positioning accuracy with all compensations available of less (better) than 4 µm along any linear axis (overall positioning); *and*

c.1.b. Three or more axes which can be coordinated simultaneously for ''contouring control''; *or*

c.2. Five or more axes which can be coordinated simultaneously for ''contouring control'';

NOTES: 2B001.c does not control grinding machines, as follows:

1. Cylindrical external, internal, and external-internal grinding machines having all the following characteristics:

a. Limited to cylindrical grinding; *and*

b. Limited to a maximum workpiece capacity of 150 mm outside diameter or length.

2. Machines designed specifically as jig grinders having any of the following characteristics:

a. The c-axis is used to maintain the grinding wheel normal to the work surface; *or*

b. The a-axis is configured to grind barrel cams.

3. Tool or cutter grinding machines shipped as complete systems with ''software'' specially designed for the production of tools or cutters.

4. Crank shaft or cam shaft grinding machines.

5. Surface grinders.

d. Electrical discharge machines (EDM) of the non-wire type which have two or more rotary axes which can be coordinated simultaneously for ''contouring control'';

e. Machine tools for removing metals, ceramics or ''composites'':

e.1. By means of:

e.1.a. Water or other liquid jets, including those employing abrasive additives;

e.1.b. Electron beam; *or*

e.1.c. ''Laser'' beam; *and*

e.2. Having two or more rotary axes which:

e.2.a. Can be coordinated simultaneously for ''contouring control''; *and*

e.2.b. Have a positioning accuracy of less (better) than 0.003°;

f. Deep-hole-drilling machines and turning machines modified for deep-hole-drilling, having a maximum depth-of-bore capability exceeding 5,000 mm and specially designed components therefor.

2B003 "Numerically controlled" or manual machine tools, and specially designed components, controls and accessories therefor, specially designed for the shaving, finishing, grinding or honing of hardened (R_c = 40 or more) spur, helical and double-helical gears with a pitch diameter exceeding 1,250 mm and a face width of 15% of pitch diameter or larger finished to a quality of AGMA 14 or better (equivalent to ISO 1328 class 3).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*County Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 2B993
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B004 Hot "isostatic presses", having all of the following characteristics described in the List of Items Controlled, and specially designed dies, molds, components, accessories and controls therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
NP applies to entire entry, except 2B004.b.3 and presses with temperatures exceeding 1,733K, and pressure below 69 MPa.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 2B104 and 2B204
Related Definitions: N/A
Items: a. A controlled thermal environment within the closed cavity and possessing a chamber cavity with an inside diameter of 406 mm or more; *and*

b. Any of the following:

b.1. A maximum working pressure exceeding 207 MPa;

b.2. A controlled thermal environment exceeding 1,773 K (1,500° C); *or*

b.3. A facility for hydrocarbon impregnation and removal of resultant gaseous degradation products.

TECHNICAL NOTE: The inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.

2B005 Equipment specially designed for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications for non-electronic substrates, by processes shown in the Table and associated Notes following 2E003.f, and specially designed automated handling, positioning, manipulation and control components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control chemical vapor deposition, cathodic arc, sputter deposition, ion plating or ion implantation equipment specially designed for cutting or machining tools.
Related Definitions: N/A
Items: a. ''Stored program controlled'' chemical vapor deposition (CVD) production equipment having all of the following:

a.1. Process modified for one of the following:

a.1.a. Pulsating CVD;

a.1.b. Controlled nucleation thermal decomposition (CNTD); *or*

a.1.c. Plasma enhanced or plasma assisted CVD; *and*

a.2. Any of the following:

a.2.a. Incorporating high vacuum (equal to or less than 0.01 Pa) rotating seals; *or*

a.2.b. Incorporating *in situ* coating thickness control;

b. ''Stored program controlled'' ion implantation production equipment having beam currents of 5 mA or more;

c. ''Stored program controlled'' electron beam physical vapor (EB-PVD) production equipment incorporating all of the following:

c.1. Power systems rated for over 80 kW;

c.2. A liquid pool level ''laser'' control system which regulates precisely the ingots feed rate; *and*

c.3. A computer controlled rate monitor operating on the principle of photo-luminescence of the ionized atoms in the evaporant stream to control the deposition rate of a coating containing two or more elements;

d. ''Stored program controlled'' plasma spraying production equipment having any of the following characteristics:

d.1. Operating at reduced pressure controlled atmosphere (equal or less than 10 kPa measured above and within 300 mm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 0.01 Pa prior to the spraying process; *or*

d.2. Incorporating *in situ* coating thickness control;

e. ''Stored program controlled'' sputter deposition production equipment capable of current densities of 0.1 mA/mm² or higher at a deposition rate 15 μm/h or more;

f. ''Stored program controlled'' cathodic arc deposition equipment incorporating a grid of electromagnets for steering control of the arc spot on the cathode;

g. ''Stored program controlled'' ion plating production equipment allowing for the *in situ* measurement of any of the following:

g.1. Coating thickness on the substrate and rate control; *or*

g.2. Optical characteristics.

2B006 Dimensional inspection or measuring systems and equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 2B006.a and .b	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number

Related Controls: See also 2B206 and 2B996.

Related Definition: (1) Machine tools which can be used as measuring machines are controlled if they meet or exceed the criteria specified for the machine tool function or the measuring machine function. (2) A machine described by this entry is controlled if it exceeds the control threshold anywhere within its operating range.

Items: a. Computer controlled, ''numerically controlled'' or ''stored program controlled'' dimensional inspection machines, having a three dimensional length (volumetric) ''measurement uncertainty'' equal to or less (better) than (1.7 + L/1,000) μm (L is the measured length in mm) tested according to ISO 10360–2;

b. Linear and angular displacement measuring instruments, as follows:

b.1. Linear measuring instruments having any of the following:

b.1.a. Non-contact type measuring systems with a ''resolution'' equal to or less (better) than 0.2 μm within a measuring range up to 0.2 mm;

b.1.b. Linear voltage differential transformer systems having all of the following characteristics:

b.1.b.1. ''Linearity'' equal to or less (better) than 0.1% within a measuring range up to 5 mm; *and*

b.1.b.2. Drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature ± 1 K; *or*

b.1.c. Measuring systems having all of the following:

b.1.c.1. Containing a ''laser''; *and*

b.1.c.2. Maintaining, for at least 12 hours, over a temperature range of ± 1 K around a standard temperature and at a standard pressure, all of the following:

b.1.c.2.a. A ''resolution'' over their full scale of 0.1 μm or less (better); *and*

b.1.c.2.b. A ''measurement uncertainty'' equal to or less (better) than (0.2 + L/2,000) μm (L is the measured length in mm);

NOTE: 2B006.b.1 does not control measuring interferometer systems, without closed or open loop feedback, containing a ''laser'' to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.

b.2. Angular measuring instruments having an ''angular position deviation'' equal to or less (better) than 0.00025°;

NOTE: 2B006.b.2 does not control optical instruments, such as autocollimators, using collimated light to detect angular displacement of a mirror.

c. Equipment for measuring surface irregularities, by measuring optical scatter as a

function of angle, with a sensitivity of 0.5 nm or less (better).

2B007 "Robots" having any of the following characteristics described in the List of Items Controlled and specially designed controllers and "end-effectors" therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 2B007.c if specially designed or rated as radiation hardened to withstand greater than 5 X 10^4 grays(Si) without operational degradation; to 2B007.b; and to specially designed controllers and ''end-effectors'' therefor.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000, except 2B007.b and .c
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 2B207 and 2B997
Related Definitions: N/A
Items: a. Capable in real time of full three-dimensional image processing or three-dimensional scene analysis to generate or modify ''programs'' or to generate or modify numerical program data;

NOTE: The scene analysis limitation does not include approximation of the third dimension by viewing at a given angle, or limited grey scale interpretation for the perception of depth or texture for the approved tasks (2½ D).

b. Specially designed to comply with national safety standards applicable to explosive munitions environments;

c. Specially designed or rated as radiation-hardened to withstand greater than 5×10^3 Gy (Si) without operational degradation; *or*

d. Specially designed to operate at altitudes exceeding 30,000 m.

2B008 Assemblies, units or inserts specially designed for machine tools, or for equipment controlled by 2B006 or 2B007, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 2B998
Related Definition: N/A
Items: a. Linear position feedback units (e.g., inductive type devices, graduated scales, infrared systems or ''laser'' systems) having an overall ''accuracy'' less (better) than $(800 + (600 \times L \times 10^{-3}))$ nm (L equals the effective length in mm);

NOTE: For ''laser'' systems see also Note to 2B006.b.1.

b. Rotary position feedback units (e.g., inductive type devices, scales, infrared systems or ''laser'' systems) having an ''accuracy'' less (better) than 0.00025°;

NOTE: For ''laser'' systems see also Note to 2B006.b.1.

c. ''Compound rotary tables'' and ''tilting spindles'', capable of upgrading, according to the manufacturer's specifications, machine tools to or above the levels controlled by 2B001 to 2B009.

2B009 Spin-forming machines and flow-forming machines, which, according to the manufacturer's technical specifications, can be equipped with "numerical control" units or a computer control and having all the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to spin-forming machines the machines combining the functions of spin-forming and flow-forming; and flow-forming machines.	MT Column 1
NP applies to flow-forming machines; and spin-forming machines capable of flow-forming functions.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 2B109 for additional flow-forming machines for MT and NP reasons. See also 2B209 for additional flow-forming machines controlled for NP reasons.
Related Definitions: Machines combining the function of spin-forming and flow-forming are for the purpose of 2B009 regarded as flow-forming machines.
Items: a. Two or more controlled axes of which at least two can be coordinated simultaneously for ''contouring control''; *and*

b. A roller force more than 60 kN.

2B018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
MT applies to specialized machinery, equipment, and gear for producing rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets) and unmanned air vehicle systems (including cruise missile systems, target drones, and reconnaissance drones) usable in systems that are controlled for MT reasons including their propulsion systems and components, and pyrolytic deposition and densification equipment.	MT Column 1.
RS applies to entire entry	RS Column 2.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $3000, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro).

GBS: Yes for Advisory Note in this entry to 2B018, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro).

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: N/A

Related Definitions: N/A

Items: Specialized machinery, equipment, gear, and specially designed parts and accessories therefor, including but not limited to the following, that are specially designed for the examination, manufacture, testing, and checking of arms, appliances, machines, and implements of war: a. Armor plate drilling machines, other than radial drilling machines;

b. Armor plate planing machines;

c. Armor plate quenching presses;

d. Centrifugal casting machines capable of casting tubes 6 feet (183 cm) or more in length, with a wall thickness of 2 inches (5 cm) and over;

e. Gun barrel rifling and broaching machines, and tools therefor;

f. Gun barrel rifling machines;

g. Gun barrel trepanning machines;

h. Gun boring and turning machines;

i. Gun honing machines of 6 feet (183 cm) stroke or more;

j. Gun jump screw lathes;

k. Gun rifling machines;

l. Gun straightening presses;

m. Induction hardening machines for tank turret rings and sprockets;

n. Jigs and fixtures and other metal-working implements or accessories of the kinds exclusively designed for use in the manufacture of firearms, ordnance, and other stores and appliances for land, sea, or aerial warfare;

o. Small arms chambering machines;

p. Small arms deep hole drilling machines and drills therefor;

q. Small arms rifling machines;

r. Small arms spill boring machines;

s. Tank turret bearing grinding machines.

ADVISORY NOTE: Licenses are likely to be approved, as administrative exceptions, for export and reexport to Country Group D:1 of equipment used to determine the safety data of explosives, as required by the International Convention on the Transport of Dangerous Goods (C.I.M.) articles 3 and 4 in Annex 1 RID, provided that such equipment will be used only by the railway authorities of current C.I.M. members, or by the Government-accredited testing facilities in those countries, for the testing of explosives to transport safety standards, of the following description:

a. Equipment for determining the ignition and deflagration temperatures;

b. Equipment for steel-shell tests;

c. Drophammers not exceeding 20 kg in weight for determining the sensitivity of explosives to shock;

d. Equipment for determining the friction sensitivity of explosives when exposed to charges not exceeding 36 kg in weight.

2B104 Equipment and process controls designed or modified for densification and pyrolysis of structural composite rocket nozzles and reentry vehicle nose tips.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 2B104.a	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number

Related Controls: The only ''isostatic presses'' and furnaces controlled by 2B104 are: (a) ''Isostatic presses'', other than those controlled by 2B004, having all the following

characteristics: (1) Maximum working pressure of 69 MPa or greater; (2) Designed to achieve and maintain a thermal environment of 873 K (600° C) or greater; *and* (3) Possessing a chamber cavity with an diameter of 254 mm or greater; (b) CVD Furnaces designed or modified for the densification of carbon-carbon composites.

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

2B109 Flow-forming machines, other than those controlled by 2B009, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value.

Related Controls: See also 2B009 and 2B209.

Related Definition: This entry controls only spin-forming machines combining the functions of spin-forming and flow-forming and flow forming machines.

Items: a. According to the manufacturer's technical specification, can be equipped with ''numerical control'' units or a computer control, even when not equipped with such units; *and*

b. With more than two axes which can be coordinated simultaneously for ''contouring control.''

TECHNICAL NOTES: 1. Machines combining the function of spin-forming and flow-forming are for the purpose of 2B109 regarded as flow-forming machines.

2. 2B109 does not control machines that are not usable in the production of propulsion components and equipment (e.g. motor cases) for systems in 9A005, 9A007.a, or 9A105.

2B116 Vibration test systems, equipment and components therefor, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to electrodynamic vibration test systems, employing feedback or closed loop control techniques and incorporating a digital controller, capable of vibrating at 10 g RMS or more between 20 Hz and 2000 Hz and imparting forces of 50 kN (11,250 lbs.) measured ''bare table'', or greater.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: See also 9B990

Related Definitions: (1) The term ''digital control'' refers to equipment, the functions of which are, partly or entirely, automatically controlled by stored and digitally coded electrical signals. (2) The term ''bare table'' means a flat table, or surface, with no fixture or fitting.

Items: a. Vibration test systems employing feedback or closed loop techniques and incorporating a digital controller, capable of vibrating a system at 10 g RMS or more over the entire range 20 Hz to 2,000 Hz and imparting forces of 50 kN (11,250 lbs.), measured ''bare table'', or greater;

b. Digital controllers, combined with specially designed vibration test ''software'', with a real-time bandwidth greater than 5 kHz and designed for use with vibration test systems described in 2B116.a;

c. Vibration thrusters (shaker units), with or without associated amplifiers, capable of imparting a force of 50 kN (11,250 lbs.), measured ''bare table'', or greater, and usable in vibration test systems described in 2B116.a;

d. Test piece support structures and electronic units designed to combine multiple shaker units into a complete shaker system capable of providing an effective combined force of 50 kN, measured ''bare table'', or greater, and usable in vibration test systems described in 2B116.a.

2B201 Machine tools, other than those controlled by 2B001 for removing or cutting metals, ceramics or "composites", which, according to manufacturer's technical specification, can be equipped with electronic for simultaneous "contouring control" in two or more axes.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 2B290, 2B991, and 2D002 ''Numerical control'' units are controlled by their associated ''software''.
Related Definition: N/A
Items: a. Machine tools for milling, having any of the following characteristics:

a.1. ''Positioning accuracies'' with all compensations available less (better) than 0.006 mm along any linear axis (positioning); *or*

a.2. Two or more contouring rotary axes.

NOTE: 2B201.a. does not control milling having the following characteristics:

a. X-axis travel greater than 2 m;

b. Overall ''positioning accuracy'' on the x-axis more (worse) than 0.030 mm.

b. Machine tools for grinding, having any of the following characteristics:

b.1. ''Positioning accuracies'' with all compensations available less (better) than 0.004 mm along any linear axis (positioning); *or*

b.2. Two or more contouring rotary axes.

NOTE: 2B201.b does not control the following grinding machines:

a. Cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:

1. Limited to cylindrical grinding;

2. A maximum workpiece outside diameter or length of 150 mm;

3. Not more than two axes that can be simultaneously for ''contouring control''; *and*

4. No contouring c axis;

b. Jig grinders with axes limited to x, y, c and a where c-axis is used to maintain the grinding wheel normal to the work surface, and the a axis is configured to grind barrel cams;

c. Tool or cutter grinding machines with ''software'' specially designed for the production of tools or cutters; *or*

d. Crankshaft or camshaft grinding machines.

c. Machines for turning, that have ''positioning accuracies'' with all compensations available less (better) than 0.006 mm along any linear axis (overall positioning) for machines capable of machining diameters greater than 35 mm.

NOTE: Bar machines (Swissturn), limited to machining only bar feed thru, are excluded if maximum bar diameter is equal to or less than 42 mm and there is no capability of mounting chucks. Machines may have drilling and/or milling capabilities for machining parts with diameters less than 42 mm.

2B204 "Isostatic presses," not controlled by 2B004 or 2B104, capable of achieving a maximum working pressure of 69 Mpa (10,000 psi) or greater and having a chamber cavity with an inside diameter in excess of 152 mm (6 inches) and specially designed dies, molds, and controls therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definition: The inside chamber dimension is that of the chamber in which both the working temperature and working pressure are achieved and does not include fixtures. That dimension will be the smaller either the inside diameter of the pressure chamber or the inside diameter of the insulated chamber, depending on which of the two chambers is located inside the other.
Items: The list of items controlled is contained in the ECCN heading.

2B206 Dimensional inspection machines, devices or systems, other than those controlled by 2B006, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value.
Related Controls: See also 2B992.
Related Definition: (1) Machine tools that can be used as measuring machines are controlled if they meet or exceed the criteria specified for the machine function or the measuring machine function. (2) A machine controlled by 2B206 is controlled if it exceeds the control threshold anywhere within its operating range. (3) The probe used in determining the measurement uncertainty of a dimensional inspection system shall be described in VDI/VDE 2617 parts 2, 3 and 4.

Items: a. Computer controlled or numerically controlled dimensional inspection machines having both of the following characteristics:

a.1. Two or more axes; *and*

a.2. A one-dimensional length ''measurement uncertainty'' equal to or less (better) than (1.25 + L/1000) µm tested with a probe of ''accuracy'' of less (better) than 0.2 µm (L is the measured length millimeters) (Ref.:VDI/VDE 2617 Parts 1 and 2);

b. Systems for simultaneously linear-angular inspection of hemishells having both of the following characteristics:

b.1. ''Measurement uncertainty'' along any linear axis equal to less (better) than 3.5 µm per 5 mm; *and*

b.2. ''Angular position deviation'' equal to or less than 0.02°.

2B207 "Robots" or "end-effectors", other than those controlled by 2B007, specially designed to comply with national safety standards applicable to handling high explosives (for example, meeting code ratings for high explosives) and specially designed controllers therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B209 Flow forming machines, or spin forming machines capable of flow forming functions, other than those controlled by 2B009 or 2B109, or mandrels, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value.
Related Controls: N/A.
Related Definition: This entry includes machines which have only a single roller designed to deform metal plus two auxiliary rollers which support the mandrel, but do not participate directly in the deformation process.
Items: a. Machines having any of the following:

a.1. Having three or more rollers (active or guiding); *and*

a.2. According to the manufacturer's technical specification can be equipped with ''numerical control'' units or a computer control.

b. Rotor-forming mandrels designed to form cylindrical rotors of inside diameter between 75 mm (3 in.) and 400 mm (16 in.).

2B225 Remote manipulators that can be used to provide remote actions in radiochemical separation operations and hot cells, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value.
Related Controls: N/A.
Related Definition: Remote manipulators provide translation of human operator actions to a remote operating arm and terminal fixture. They may be of a ''master/slave'' type or operated by joystick or keypad.
Items: a. Having a capability of penetrating 0.6 m or more of hot cell wall (operation); *or*

b. Having a capability of bridging over the top of a hot cell wall with a thickness of 0.6 m or more (over-the-wall operation).

2B226 Vacuum or controlled environment (inert gas) induction furnaces capable of operation above 1,123 K (850° C) and having induction coils 600 mm or less in diameter, and designed for power inputs of 5 kW or more, and power supplies specially designed therefor with a specified power output of 5 kW or more.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value.
Related Controls: See also Category 3B. This entry does not control furnaces designed for the processing of semiconductor wafers.
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B227 Vacuum and controlled atmosphere metallurgical melting and casting furnaces and specially configured computer control and monitoring systems therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: a. Arc remelt and casting furnaces with consumable electrode capacities between 1000 cm^3 and 20,000 cm^3, capable of operating with melting temperatures above 1,973 K (1,700° C);

b. Electron beam melting and plasma atomization and furnaces, with a power of 50 kW or greater, capable of operating melting temperatures above 1,473 K (1,200° C).

2B228 Rotor fabrication and assembly equipment and bellows-forming mandrels and dies, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Rotor assembly equipment for assembly of gas centrifuge rotor sections, baffles and end caps, including associated precision mandrels, clamps and shrink fit machines;

b. Rotor straightening equipment for alignment of gas centrifuge rotor sections to a common axis;

TECHNICAL NOTE: Normally such equipment will consist of precision measuring probes linked to a computer that subsequently controls the action of, for example, pneumatic rams used for aligning the rotor tube sections.

c. Bellows-forming mandrels and dies for producing single-convolution bellows (bellows made of high-strength aluminum alloys, maraging steel or high strength filamentary materials). The bellows have all of the following dimensions:
c.1. 75 mm to 400 mm inside diameter;
c.2. 12.7 mm or more in length; *and*
c.3. Single convolution depth more than 2 mm.

2B229 Centrifugal multiplane balancing machines, fixed or portable, horizontal or vertical, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Centrifugal balancing machines designed for balancing flexible rotors having a length of 600 mm or more and having all of the following characteristics:

a.1. A swing or journal diameter of 75 mm or more;
a.2. Mass capability of from 0.9 to 23 kg; *and*
a.3. Capable of balancing speed of revolution more than 5000 r.p.m.;
b. Centrifugal balancing machines designed for balancing hollow cylindrical rotor components and having all of the following characteristics:
b.1. A journal diameter of 75 mm or more;
b.2. Mass capability of from 0.9 to 23 kg;
b.3. Capable of balancing to a residual imbalance of 0.01 kg mm/kg per plane or better; *and*
b.4. Belt drive type.

2B230 "Pressure transducers" which are capable of measuring absolute pressure at any point in the range 0 to 13 kPa, with pressure sensing elements made of or protected by nickel, nickel alloys with

more than 60% nickel by weight, aluminum or aluminum alloys, having any of the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value.
Related Controls: N/A
Related Definitions: (1) Pressure transducers are devices that convert pressure measurements into an electrical signal. (2) For the purposes of this entry, ''accuracy'' includes non-linearity, hysteresis and repeatability at ambient temperature.
Items: a. A full scale of less than 13 kPa and an ''accuracy'' of better than +/−1% (full−scale); *or*

b. A full scale of 13 kPa or greater and an ''accuracy'' of better than +/−130 Pa.

2B231 Vacuum pumps with an input throat size of 380 mm or greater with a pumping speed of 15,000 liters/s or greater and capable of producing an ultimate vacuum better than 10^{-4} Torr (1.33×10^{-4} mbar).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Vacuum pumps for gaseous diffusion separation process are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definition: (1) The ultimate vacuum is determined at the input of the pump with the input of the pump blocked off. (2) The pumping speed is determined at the measurement point with nitrogen gas or air.
Items: The list of items controlled is contained in the ECCN heading.

2B232 Multistage light gas guns or other high-velocity gun systems (coil, electromagnetic, electrothermal, or other advanced systems) capable of accelerating projectiles to 2 km/s or greater.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value.
Related Controls: N/A.
Related Definitions: N/A.
Items: The list of items controlled is contained in the ECCN heading.

2B290 "Numerically controlled" machine tools not controlled by 2B001.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definition: N/A
Items: a. Turning machines or combination turning/milling machines that are capable of machining diameters greater than 2.5 meters.

b. Reserved.

2B350 Chemical manufacturing facilities and equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number.

Related Controls: The controls in this entry do not apply to equipment that is: (a) specially designed for use in civil applications (e.g., food processing, pulp and paper processing, or water purification); and (b) inappropriate, by the nature of its design, for use in storing, processing, producing or conducting and controlling the flow of chemical weapons precursors controlled by 1C350.

Related Definitions: For purposes of this entry the term ''chemical warfare agents'' are those agents subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121)

Items: a. Reaction vessels or reactors, with or without agitators, with total internal (geometric) volume greater than 0.1 m^3 (100 liters) and less than 20 m^3 (20,000 liters), where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:

a.1. Alloys with more than 25% nickel and 20% chromium by weight;

a.2. Fluoropolymers;

a.3. Glass (including vitrified or enamelled coating or glass lining);

a.4. Nickel or alloys with more than 40% nickel by weight;

a.5. Tantalum or tantalum alloys;

a.6. Titanium or titanium alloys; *or*

a.7. Zirconium or zirconium alloys;

b. Agitators for use in reaction vessels or reactors where all surfaces of the agitator that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:

b.1. Alloys with more than 25% nickel and 20% chromium by weight;

b.2. Fluoropolymers;

b.3. Glass (including vitrified or enamelled coatings or glass lining);

b.4. Nickel or alloys with more than 40% nickel by weight;

b.5. Tantalum or tantalum alloys;

b.6. Titanium or titanium alloys; *or*

b.7. Zirconium or zirconium alloys;

c. Storage tanks, containers or receivers with a total internal (geometric) volume greater than 0.1 m^3 (100 liters) where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:

c.1. Alloys with more than 25% nickel and 20% chromium by weight;

c.2. Fluoropolymers;

c.3. Glass (including vitrified or enamelled coatings or glass lining);

c.4. Nickel or alloys with more than 40% nickel by weight;

c.5. Tantalum or tantalum alloys;

c.6. Titanium or titanium alloys; *or*

c.7. Zirconium or zirconium alloys;

d. Heat exchangers or condensers with a heat transfer surface area of less than 20 m^2, where all surfaces that comes in direct contact with the chemical(s) being processed are made from any of the following materials:

d.1. Alloys with more than 25% nickel and 20% chromium by weight;

d.2. Fluoropolymers;

d.3. Glass (including vitrified or enamelled coatings or glass lining);

d.4. Graphite;

d.5. Nickel or alloys with more than 40% nickel by weight;

d.6. Tantalum or tantalum alloys;

d.7. Titanium or titanium alloys; *or*

d.8. Zirconium or zirconium alloys;

e. Distillation or absorption columns of internal diameter greater than 0.1 m, where all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:

e.1. Alloys with more than 25% nickel and 20% chromium by weight;

e.2. Fluoropolymers;

e.3. Glass (including vitrified or enamelled coatings or glass lining);

e.4. Graphite;

e.5. Nickel or alloys with more than 40% nickel by weight;

e.6. Tantalum or tantalum alloys;

e.7. Titanium or titanium alloys; *or*

e.8. Zirconium or zirconium alloys;

f. Remotely operated filling equipment in which all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:

f.1. Alloys with more than 25% nickels and 20% chromium by weight, or

f.2. Nickel or alloys with more than 40% nickel by weight;

g. Multiple seal valves incorporating a leak detection port, bellows-seal valves, nonreturn (check) valves or diaphragm valves, in which all surfaces that come in to direct contact with the chemical(s) being processed or contained are made from any of the following materials:

g.1. Alloys with more than 25% nickel and 20% chromium by weight;

g.2. Fluoropolymers;

g.3. Glass (including vitrified or enamelled coatings or glass lining);

g.4. Nickel or alloys with more than 40% nickel by weight;

g.5. Tantalum or tantalum alloys;

g.6. Titanium or titanium alloys; *or*

g.7. Zirconium or zirconium alloys;

h. Multi-walled piping incorporating a leak detection port, in which all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:

h.1. Alloys with more than 25% nickel and 20% chromium by weight;

h.2. Fluoropolymers;

h.3. Glass (including vitrified or enamelled coatings or glass lining);

h.4. Graphite;

h.5. Nickel or alloys with more than 40% nickel by weight;
h.6. Tantalum or tantalum alloys;
h.7. Titanium or titanium alloys; *or*
h.8. Zirconium or zirconium alloys;
i. Multiple-seal, canned drive, magnetic drive, bellows or diaphragm pumps, with manufacturer's specified maximum flow-rate greater than 0.6 m^3/hour, or vacuum pumps with manufacturer's specified maximum flow-rate greater than 5 m^3/hour (under standard temperature (273 K (0°C)) and pressure (101.3 kPa) conditions), in which all surfaces that come into direct contact with the chemical(s) being processed are made from any of the following materials:
i.1. Alloys with more than 25% nickel and 20% chromium by weight;
i.2. Ceramics;
i.3. Ferrosilicon;
i.4. Fluoropolymers;
i.5. Glass (including vitrified or enamelled coatings or glass lining);
i.6. Graphite;
i.7. Nickel or alloys with more than 40% nickel by weight;
i.8. Tantalum or tantalum alloys;
i.9. Titanium or titanium alloys, or
i.10. Zirconium or zirconium alloys;
j. Incinerators designed to destroy chemical warfare agents, or chemical weapons precursors controlled by 1C350, having specially designed waste supply systems, special handling facilities and an average combustion chamber temperature greater than 1000°C in which all surfaces in the waste supply system that come into direct contact with the waste products are made from or lined with any of the following materials:
j.1. Alloys with more than 25% nickel and 20% chromium by weight;
j.2. Ceramics; *or*
j.3. Nickel or alloys with more than 40% nickel by weight.

2B351 Toxic gas monitoring systems and dedicated detectors therefor.

LICENSE REQUIREMENTS

Reason for Control: CB, AT.

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Designed for continuous operation and usable for the detection of chemical warfare agents, chemicals controlled by 1C350 or organic compounds containing phosphorus, sulphur, fluorine or chlorine, at concentrations of less than 0.3 mg/m^3; *or*

b. Designed for the detection of cholinesterase-inhibiting activity.

2B352 Equipment capable of use in handling biological materials, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: For purposes of this entry, isolators include flexible isolators, dry boxes, anaerobic chambers and glove boxes.
Items: a. Complete containment facilities at P3 or P4 containment level;

TECHNICAL NOTE: P3 or P4 (BL3, BL4, L3, L4) containment levels are as specified in the WHO Laboratory Biosafety Manual (Geneva, 1983).

b. Fermenters capable of cultivation of pathogenic microorganisms, viruses, or for toxin production, without the propagation of aerosols, having a capacity equal to or greater than 100 liters.

TECHNICAL NOTE: Fermenters include bioreactors, chemostats, and continuous-flow systems.

c. Centrifugal separators capable of the continuous separation of pathogenic microorganisms, without the propagation of aerosols, and having all of the following characteristics:
c.1. A flow rate greater than 100 liters per hour;
c.2. Components of polished stainless steel or titanium;
c.3. Double or multiple sealing joints within the steam containment area; *and*
c.4. Capable of *in situ* steam sterilization in a closed state.

TECHNICAL NOTE: Centrifugal separators include decanters.

d. Cross-flow filtration equipment capable of continuous separation of pathogenic microorganisms, viruses, toxins, and cell cultures without the propagation of aerosols, having all of the following characteristics:
d.1. Equal to or greater than 5 square meters;
d.2. Capable of *in situ* sterilization.

e. Steam sterilizable freeze-drying equipment with a condenser capacity greater than 50 kgs of ice in 24 hours but less than 1,000 kgs;

f. Equipment that incorporates or is contained in P3 or P4 containment housing, as follows:

f.1. Independently ventilated protective full or half suits;

f.2. Class III biological safety cabinets or isolators with similar performance standards;

g. Chambers designed for aerosol challenge testing with microorganisms, viruses, or toxins and having a capacity of 1 m^3 or greater.

2B991 Numerical control units for machine tools and "numerically controlled" machine tools, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Numerical control'' units for machine tools:

a.1. Having four interpolating axes that can be coordinated simultaneously for ''contouring control''; or

a.2. Having two or more axes that can be coordinated simultaneously for ''contouring control'' and a minimum programmable increment better (less) than 0.001 mm;

a.3. ''Numerical control'' units for machine tools having two, three or four interpolating axes that can be coordinated simultaneously for ''contouring control'', and capable of receiving directly (on-line) and processing computer-aided-design (CAD) data for internal preparation of machine instructions; *or*

b. ''Motion control boards'' specially designed for machine tools and having any of the following characteristics:

b.1. Interpolation in more than four axes;

b.2. Capable of ''real time processing'' of data to modify tool path, feed rate and spindle data, during the machining operation, by any of the following:

b.2.a. Automatic calculation and modification of part program data for machining in two or more axes by means of measuring cycles and access to source data; *or*

b.2.b. ''Adaptive control'' with more than one physical variable measured and processed by means of a computing model (strategy) to change one or more machining instructions to optimize the process.

b.3. Capable of receiving and processing CAD data for internal preparation of machine instructions; *or*

c. ''Numerically controlled'' machine tools that, according to the manufacturer's technical specifications, can be equipped with electronic devices for simultaneous ''contouring control'' in two or more axes and that have both of the following characteristics:

c.1. Two or more axes that can be coordinated simultaneously for contouring control; *and*

c.2. ''Positioning accuracies'', with all compensations available:

c.2.a. Better than 0.020 mm along any linear axis (overall positioning) for grinding machines;

c.2.b. Better than 0.020 mm along any linear axis (overall positioning) for milling machines; *or*

c.2.c. Better than 0.020 mm along any linear axis (overall positioning) for turning machines; *or*

d. Machine tools, as follows, for removing or cutting metals, ceramics or composites, that, according to the manufacturer's technical specifications, can be equipped with electronic devices for simultaneous ''contouring control'' in two or more axes:

d.1. Machine tools for turning, grinding, milling or any combination thereof, having two or more axes that can be coordinated simultaneously for ''contouring control'' and having any of the following characteristics:

d.1.a. One or more contouring ''tilting spindles'';

NOTE: 2B991.d.1.a. applies to machine tools for grinding or milling only.

d.1.b. ''Camming'' (axial displacement) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

NOTE: 2B991.d.1.b. applies to machine tools for turning only.

d.1.c. ''Run out'' (out-of-true running) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

d.1.d. The ''positioning accuracies'', with all compensations available, are less (better) than: 0.001° on any rotary axis;

d.2. Electrical discharge machines (EDM) of the wire feed type that have five or more axes that can be coordinated simultaneously for ''contouring control''.

2B992 Non-"numerically controlled" machine tools for generating optical quality surfaces, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry ..... AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Turning machines using a single point cutting tool and having all of the following characteristics:

a.1. Slide positioning accuracy less (better) than 0.0005 mm per 300 mm of travel;

a.2. Bidirectional slide positioning repeatability less (better) than 0.00025 mm per 300 mm of travel;

a.3. Spindle ''run out'' and ''camming'' less (better) than 0.0004 mm total indicator reading (TIR);

a.4. Angular deviation of the slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over full travel; *and*

a.5. Slide perpendicularity less (better) than 0.001 mm per 300 mm of travel;

TECHNICAL NOTE: The bidirectional slide positioning repeatability (R) of an axis is the maximum value of the repeatability of positioning at any position along or around the axis determined using the procedure and under the conditions specified in part 2.11 of ISO 230/2: 1988.

b. Fly cutting machines having all of the following characteristics:

b.1. Spindle ''run out'' and ''camming'' less (better) than 0.0004 mm TIR; *and*

b.2. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over full travel.

2B993 Gearmaking and/or finishing machinery not controlled by 2B003 capable of producing gears to a quality level of better than AGMA 11.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry ..... AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B996 Dimensional inspection or measuring systems or equipment not controlled by 2B006.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry ..... AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Manual dimensional inspection machines, having both of the following characteristics:

a.1. Two or more axes; *and*

a.2. A measurement uncertainty equal to or less (better) than (3 + L/300) micrometer in any axes (L measured length in mm);

b. Systems for simultaneous linear-angular inspection of hemishells, having both of the following characteristics:

b.1. ''Measurement uncertainty'' along any linear axis equal to or less (better) than 3.5 micrometer per 5 mm; *and*

b.2. ''Angular position deviation'' equal to or less (better) than 0.02°;

2B997 "Robots" not controlled by 2B007 or 2B207 that are capable of employing feedback information in real-time processing from one or more sensors to generate or modify "programs" or to generate or modify numerical program data.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry ..... AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B998 Assemblies, units or inserts specially designed for machine tools controlled by 2B991, or for equipment controlled by 2B993, 2B996 or 2B997.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control measuring interferometer systems, without closed or open loop feedback, containing a laser to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.
Related Definition: N/A
Items: a. Spindle assemblies, consisting of spindles and bearings as a minimal assembly, with radial (''run out'') or axial (''camming'') axis motion in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

b. Single point diamond cutting tool inserts, having all of the following characteristics:

b.1. Flawless and chip-free cutting edge when magnified 400 times in any direction;

b.2. Cutting radius from 0.1 to 5 mm inclusive; *and*

b.3. Cutting radius out-of-roundness less (better) than 0.002 mm TIR.

c. Specially designed printed circuit boards with mounted components capable of upgrading, according to the manufacturer's specifications, ''numerical control'' units, machine tools or feedback devices to or above the levels specified in ECCNs 2B991, 2B993, 2B996, 2B997, or 2B998.

C. MATERIALS [RESERVED]

D. SOFTWARE

2D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 2A001 or 2B001 to 2B009.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for equipment controlled by 2B004 and 2B009 for MT reasons.	MT Column 1
NP applies to specially designed or modified ''software'' for equipment controlled by 2B001 for NP reasons, and to specially designed ''software'' for equipment controlled by 2B004, 2B006, 2B007, or 2B009 for NP reasons.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 2D101 and 2D201
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D002 "Software" for electronic devices, even when residing in an electronic device or system, enabling such devices or systems to function as a "numerical control" unit, capable of any of the following (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
NP applies to entire entry, except 2D002.b.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 2D202. (2) This entry does not control ''software'' specially designed or modified for the operation of machine tools not controlled by Category 2.
Related Definitions: N/A
Items: a. Coordinating simultaneously more than 4 axes for ''contouring control''; *or*
b. ''Real time processing'' of data to modify tool path, feed rate and spindle data, during the machining operation, by any of the following:
b.1. Automatic calculation and modification of part program data for machining in two or more axes by means of measuring cycles and access to source data; *or*
b.2. ''Adaptive control'' with more than one physical variable measured and processed by means of a computing model (strategy) to change one or more machining instructions to optimize the process.

2D018 "Software" for the "development", "production" or "use" of equipment controlled by 2B018.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.

Control(s)	*Country Chart*
MT applies to ''software'' for equipment controlled by 2B018 for MT reasons.	MT Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D101 "Software" specially designed for the "use" of equipment controlled by 2B104, 2B109 or 2B116.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 9D004
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D201 "Software" specially designed for the "use" of equipment controlled by 2B204, 2B206, 2B207, 2B209, 2B227 or 2B229.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D202 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 2B201.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D290 "Software" specially designed or modified for the "development", "production" or "use" of items controlled by 2A290, 2A291, 2A292, 2A293, or 2B290.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D991 "Software" specially designed for the "development", "production", or "use" of equipment controlled by 2B991, 2B993, or 2B996, 2B997, and 2B998.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D992. Specific "software", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Software'' to provide ''adaptive control'' and having both of the following characteristics:

a.1. For ''flexible manufacturing units'' (FMUs) which consist at least of equipment described in b.1 and b.2 of the definition of ''flexible manufacturing unit'' contained in part 772 of the EAR; *and*

a.2. Capable of generating or modifying, in ''real time processing'', programs or data by using the signals obtained simultaneously by means of at least two detection techniques, such as:

a.2.a. Machine vision (optical ranging);

a.2.b. Infrared imaging;

a.2.c. Acoustical imaging (acoustical ranging);

a.2.d. Tactile measurement;

a.2.e. Inertial positioning;

a.2.f. Force measurement; *and*

a.2.g. Torque measurement.

NOTE: 2D992.a does not control ''software'' which only provides rescheduling of functionally identical equipment within ''flexible manufacturing units'' using pre-stored part programs and a pre-stored strategy for the distribution of the part programs.

b. Reserved.

2D994 "Software" specially designed for the "development" or "production" of portable electric generators controlled by 2A994.

LICENSE REQUIREMENTS

Reason for Control: AT
Control(s)

AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya, and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to *Iran* must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §742.8 and §746.7 for additional information on this requirement.)

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

2E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" controlled by 2A (except 2A991, 2A993, or 2A994), 2B (except 2B991, 2B993, 2B996, 2B997, or 2B998), or 2D (except 2D991, 2D992, or 2D994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, CB, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 2A001, 2B001 to 2B009, 2D001 or 2D002	NS Column 1
MT applies to ''technology'' for items controlled by 2B004, 2B009, 2B018, 2B104, 2B109, 2B116, 2D001 or 2D101 for MT reasons	MT Column 1
NP applies to ''technology'' for items controlled by 2B001, 2B004, 2B006, 2B007 2B009, 2B104, 2B109, 2B204 2B206, 2B207, 2B209, 2B225, 2B226, 2B228, 2B229, 2B231, 2D001, 2D002, or 2D201 for NP reasons	NP Column 1
NP applies to ''technology'' for equipment controlled by 2A290	NP Column 2
CB applies to ''technology'' for equipment controlled by 2B350 to 2B352	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 2E101, 2E201, and 2E301
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E002 "Technology" according to the General Technology Note for the "production" of equipment controlled by 2A (except 2A991, 2A993, or 2A994), or 2B (except 2B991, 2B993, 2B996, 2B997, or 2B998).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, CB, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for equipment controlled by 2A001, 2B001 to 2B009	NS Column 1
MT applies to ''technology'' for equipment controlled by 2B004, 2B009, 2B018, 2B104, 2B109, and 2B116 for MT reasons	MT Column 1
NP applies to ''technology'' for equipment controlled by 2B001, 2B004, 2B006, 2B007, 2B009, 2B104, 2B109, 2B204, 2B206, 2B207, 2B209, 2B225, 2B226, 2B228, 2B229, or 2B231 for NP reasons	NP Column 1
NP applies to ''technology'' for equipment controlled by 2A290	NP Column 2
CB applies to ''technology'' for equipment controlled by 2B350 to 2B352	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

2E003 Other "technology", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except 2E003.a, .b, .e and .f

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: a. ''Technology'' for the ''development'' of interactive graphics as an integrated part in ''numerical control'' units for preparation or modification of part programs;

b. ''Technology'' for metal-working manufacturing processes, as follows:

b.1. ''Technology'' for the design of tools, dies or fixtures specially designed for any of the following processes:

b.1.a. ''Superplastic forming'';

b.1.b. ''Diffusion bonding''; *or*

b.1.c. ''Direct-acting hydraulic pressing'';

b.2. Technical data consisting of process methods or parameters as listed below used to control:

b.2.a. ''Superplastic forming'' of aluminum alloys, titanium alloys or ''superalloys'':

b.2.a.1. Surface preparation;

b.2.a.2. Strain rate;

b.2.a.3. Temperature;

b.2.a.4. Pressure;

b.2.b. ''Diffusion bonding'' of ''superalloys'' or titanium alloys:

b.2.b.1. Surface preparation;

b.2.b.2. Temperature;

b.2.b.3. Pressure;

b.2.c. ''Direct-acting hydraulic pressing'' of aluminum alloys or titanium alloys:

b.2.c.1. Pressure;

b.2.c.2. Cycle time;

b.2.d. ''Hot isostatic densification'' of titanium alloys, aluminum alloys or ''superalloys'':

b.2.d.1. Temperature;

b.2.d.2. Pressure;

b.2.d.3. Cycle time;

c. ''Technology'' for the ''development'' or ''production'' of hydraulic stretch-forming machines and dies therefor, for the manufacture of airframe structures;

d. ''Technology'' for the ''development'' of generators of machine tool instructions (e.g., part programs) from design data residing inside ''numerical control'' units;

e. ''Technology for the development'' of integration ''software'' for incorporation of expert systems for advanced decision support of shop floor operations into ''numerical control'' units;

f. ''Technology'' for the application of inorganic overlay coatings or inorganic surface modification coatings (specified in column 3 of the following table) to non-electronic substrates (specified in column 2 of the following table), by processes specified in column 1 of the following table and defined in the Technical Note.

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES

[The numbers in parentheses refer to the Notes following this Table]

1. *Coating Process* (1)	2. *Substrate*	3. *Resultant Coating*
A. Chemical Vapor Deposition (CVD)	''Superalloys''	Aluminides for internal passages
	Ceramics and Low-expansion glasses (14).	Silicides Carbides Dielectric layers (15)

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES—Continued

[The numbers in parentheses refer to the Notes following this Table]

1. *Coating Process* (1)	2. *Substrate*	3. *Resultant Coating*
	Carbon-carbon, Ceramic, and Metal ''matrix'' ''composites''.	Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15) Aluminides Alloyed aluminides (2)
	Cemented tungsten carbide (16), Silicon carbide.	Carbides Tungsten Mixtures thereof (4) Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15)
B. Thermal-Evaporation Physical Vapor Deposition (TE–PVD)		
1. Physical Vapor Deposition (PVD): Electron-Beam (EB–PVD).	''Superalloys''	Alloyed silicides Alloyed aluminides (2) MCrAlX (5) Modified zirconia (12) Silicides Aluminides Mixtures thereof (4)
	Ceramics and Low-expansion glasses (14).	Dielectric layers (15)
	Corrosion resistant steel (7)	MCrAlX (5) Modified zirconia (12) Mixtures thereof (4)
	Carbon-carbon, Ceramic and Metal ''matrix'' ''composites''.	Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15)
	Cemented tungsten carbide (16), Silicon carbide.	Carbides Tungsten Mixtures thereof (4) Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15) Borides
	Sensor window materials (9)	Dielectric layers (15)
	Titanium alloys (13)	Borides Nitrides
2. Ion assisted resistive heating Physical Vapor Deposition (Ion Plating).	Ceramics and Low-expansion glasses (14).	Dielectric layers (15)
	Carbon-carbon, Ceramic and Metal ''matrix'' ''composites''.	Dielectric layers (15)
	Cemented tungsten carbide (16) Silicon carbide.	Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric Layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15)
	Sensor window materials (9)	Dielectric Layers (15)
3. Physical Vapor Deposition: ''laser'' evaporation.	Ceramics and Low-expansion glasses (14).	Silicides Dielectric layers (15)
	Carbon-carbon, Ceramic and Metal ''matrix'' ''composites''.	Dielectric layers (15)
	Cemented tungsten carbide (16), Silicon carbide.	Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15) Diamond-like carbon
4. Physical Vapor Deposition: cathodic arc discharge.	''Superalloys''	Alloyed silicides Alloyed Aluminides (2) MCrAlX (5)
	Polymers (11) and Organic ''matrix'' ''composites''.	Borides Carbides Nitrides

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES—Continued

[The numbers in parentheses refer to the Notes following this Table]

1. *Coating Process* (1)	2. *Substrate*	3. *Resultant Coating*
C. Pack cementation (see A above for out-of-pack cementation) (10).	Carbon-carbon, Ceramic and Metal ''matrix'' ''composites''.	Silicides Carbides Mixtures thereof (4)
	Titanium alloys (13)	Silicides Aluminides Alloyed aluminides (2)
	Refractory metals and alloys (8)	Silicides Oxides
D. Plasma spraying	''Superalloys''	MCrAlX (5) Modified zirconia (12) Mixtures Thereof (4) Abradable Nickel-Graphite Abradable Ni-Cr-Al- Bentonite Abradable Al-Si-Polyester Alloyed aluminides (2)
	Aluminum alloys (6)	MCrAlX (5) Modified zirconia (12) Silicides Mixtures thereof (4)
	Refractory metals and alloys (8)	Aluminides Silicides Carbides
	Corrosion resistant steel (7)	Modified zirconia (12) Mixtures thereof (4)
	Titanium alloys (13)	Carbides Aluminides Silicides Alloyed aluminides (2) Abradable Nickel-Graphite Abradable Ni-Cr-Al- Bentonite Abradable Al-Si-Polyester
E. Slurry Deposition	Refractory metals alloys (8)	Fused silicides Fused aluminides except for resistance heating elements
	Carbon-carbon, Ceramic and Metal ''matrix'' ''composites''.	Silicides Carbides Mixtures thereof (4)
F. Sputter Deposition	''Superalloys''	Alloyed silicides Alloyed aluminides (2) Noble metal modified aluminides (3) MCrAlX (5) Modified zirconia (12) Platinum Mixtures thereof (4)
	Ceramics and Low-expansion glasses (14).	Silicides Platinum Mixtures thereof (4) Dielectric layers (15)
	Titanium alloys (13)	Borides Nitrides Oxides Silicides Aluminides Alloyed aluminides (2) Carbides
	Carbon-carbon, Ceramic and Metal ''matrix'' ''Composites''.	Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15)

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES—Continued

[The numbers in parentheses refer to the Notes following this Table]

1. *Coating Process* (1)	2. *Substrate*	3. *Resultant Coating*
	Cemented tungsten carbide (16), Silicon carbide.	Carbides Tungsten Mixtures thereof (4) Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Borides Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15)
	Refractory metals and alloys (8)	Aluminides Silicides Oxides Carbides
G. Ion Implantation	High temperature bearing steels	Additions of Chromium, Tantalum, or Niobium (Columbium)
	Titanium alloys (13)	Borides Nitrides
	Beryllium and Beryllium alloys	Borides
	Cemented tungsten carbide (16)	Carbides Nitrides

NOTES TO TABLE ON DEPOSITION TECHNIQUES

1. The term 'coating process' includes coating repair and refurbishing as well as original coating.

2. The term 'alloyed aluminide coating' includes single or multiple-step coatings in which an element or elements are deposited prior to or during application of the aluminide coating, even if these elements are deposited by another coating process. It does not, however, include the multiple use of single-step pack cementation processes to achieve alloyed aluminides.

3. The term 'noble metal modified aluminide' coating includes multiple-step coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating.

4. Mixtures consist of infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in the Table.

5. MCrAlX refers to a coating alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon, tantalum in any amount or other intentional additions over 0.01 weight percent in various proportions and combinations, except:

a. CoCrAlY coatings which contain less than 22 weight percent of chromium, less than 7 weight percent of aluminum and less than 2 weight percent of yttrium;

b. CoCrAlY coatings which contain 22 to 24 weight percent of chromium, 10 to 12 weight percent of aluminum and 0.5 to 0.7 weight percent of yttrium; *or*

c. NiCrAlY coatings which contain 21 to 23 weight percent of chromium, 10 to 12 weight percent of aluminum and 0.9 to 1.1 weight percent of yttrium.

6. The term 'aluminum alloys' refers to alloys having an ultimate tensile strength of 190 MPa or more measured at 293 K (20° C).

7. The term 'corrosion resistant steel' refers to AISI (American Iron and Steel Institute) 300 series or equivalent national standard steels.

8. Refractory metals consist of the following metals and their alloys: niobium (columbium), molybdenum, tungsten and tantalum.

9. Sensor window materials, as follows: alumina, silicon, germanium, zinc sulphide, zinc selenide, gallium arsenide and the following metal halides: potassium iodide, potassium fluoride, or sensor window materials of more than 40 mm diameter for thallium bromide and thallium chlorobromide.

10. ''Technology'' for single-step pack cementation of solid airfoils is not controlled by this Category.

11. Polymers, as follows: polyimide, polyester, polysulfide, polycarbonates and polyurethanes.

12. Modified zirconia refers to additions of other metal oxides, (e.g., calcia, magnesia, yttria, hafnia, rare earth oxides) to zirconia in order to stabilize certain crystallographic phases and phase compositions. Thermal barrier coatings made of zirconia, modified with calcia or magnesia by mixing or fusion, are not controlled.

13. Titanium alloys refers to aerospace alloys having an ultimate tensile strength of 900 MPa or more measured at 293 K (20° C).

14. Low-expansion glasses refers to glasses which have a coefficient of thermal expansion of 1×10^{-7} K^{-1} or less measured at 293 K (20° C).

15. Dielectric layers are coatings constructed of multi-layers of insulator materials in which the interference properties of a design composed of materials of various refractive indices are used to reflect, transmit or absorb various wavelength bands. Dielectric layers refers to more than four dielectric layers or dielectric/metal ''composite'' layers.

16. Cemented tungsten carbide does not include cutting and forming tool materials consisting of tungsten carbide/(cobalt, nickel), titanium carbide/(cobalt, nickel), chromium carbide/nickel-chromium and chromium carbide/nickel.

TECHNICAL NOTE TO TABLE ON DEPOSITION TECHNIQUES

Processes specified in Column 1 of the Table are defined as follows:

a. Chemical Vapor Deposition (CVD) is an overlay coating or surface modification coating process wherein a metal, alloy, ''composite'', dielectric or ceramic is deposited upon a heated substrate. Gaseous reactants are decomposed or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloy or compound material on the substrate. Energy for this decomposition or chemical reaction process may be provided by the heat of the substrate, a glow discharge plasma, or ''laser'' irradiation.

NOTE 1: CVD includes the following processes: directed gas flow out-of-pack deposition, pulsating CVD, controlled nucleation thermal decomposition (CNTD), plasma enhanced or plasma assisted CVD processes.

NOTE 2: Pack denotes a substrate immersed in a powder mixture.

NOTE 3: The gaseous reactants used in the out-of-pack process are produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact with the powder mixture.

b. Thermal Evaporation-Physical Vapor Deposition (TE–PVD) is an overlay coating process conducted in a vacuum with a pressure less than 0.1 Pa wherein a source of thermal energy is used to vaporize the coating material. This process results in the condensation, or deposition, of the evaporated species onto appropriately positioned substrates. The addition of gases to the vacuum chamber during the coating process to synthesize compound coatings is an ordinary modification of the process. The use of ion or electron beams, or plasma, to activate or assist the coating's deposition is also a common modification in this technique. The use of monitors to provide in-process measurement of optical characteristics and thickness of coatings can be a feature of these processes. Specific TE–PVD processes are as follows:

1. Electron Beam PVD uses an electron beam to heat and evaporate the material which forms the coating;

2. Resistive Heating PVD employs electrically resistive heating sources capable of producing a controlled and uniform flux of evaporated coating species;

3. ''Laser'' Evaporation uses either pulsed or continuous wave ''laser'' beams to heat the material which forms the coating;

4. Cathodic Arc Deposition employs a consumable cathode of the material which forms the coating and has an arc discharge established on the surface by a momentary contact of a ground trigger. Controlled motion of arcing erodes the cathode surface creating a highly ionized plasma. The anode can be either a cone attached to the periphery of the cathode, through an insulator, or the chamber. Substrate biasing is used for non line-of-sight deposition.

NOTE: This definition does not include random cathodic arc deposition with non-biased substrates.

c. Ion Plating is a special modification of a general TE–PVD process in which a plasma or an ion source is used to ionize the species to be deposited, and a negative bias is applied to the substrate in order to facilitate the extraction of the species to be deposited from the plasma. The introduction of reactive species, evaporation of solids within the process chamber, and the use of monitors to provide in-process measurement of optical characteristics and thicknesses of coatings are ordinary modifications of the process.

d. Pack Cementation is a surface modification coating or overlay coating process wherein a substrate is immersed in a powder mixture (a pack), that consists of:

1. The metallic powders that are to be deposited (usually aluminum, chromium, silicon or combinations thereof);

2. An activator (normally a halide salt); *and*

3. An inert powder, most frequently alumina. The substrate and powder mixture is contained within a retort which is heated to between 1,030 K (757° C) to 1,375 K (1,102° C) for sufficient time to deposit the coating.

e. Plasma Spraying is an overlay coating process wherein a gun (spray torch) which produces and controls a plasma accepts powder or wire coating materials, melts them and propels them towards a substrate, whereon an integrally bonded coating is formed. Plasma spraying constitutes either low pressure plasma spraying or high velocity plasma spraying carried out underwater.

NOTE 1: Low pressure means less than ambient atmospheric pressure.

NOTE 2: High velocity refers to nozzle-exit gas velocity exceeding 750 m/s calculated at 293 K (20° C) at 0.1 MPa.P

f. Slurry Deposition is a surface modification coating or overlay coating process

wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is applied to a substrate by either spraying, dipping or painting, subsequent air or oven drying, and heat treatment to obtain the desired coating.

g. Sputter Deposition is an overlay coating process based on a momentum transfer phenomenon, wherein positive ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on an appropriately positioned substrate.

NOTE 1: The Table refers only to triode, magnetron or reactive sputter deposition which is used to increase adhesion of the coating and rate of deposition and to radio frequency (RF) augmented sputter deposition used to permit vaporization of non-metallic coating materials.

NOTE 2: Low-energy ion beams (less than 5 keV) can be used to activate the deposition.

h. Ion Implantation is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. This includes processes in which ion implantation is performed simultaneously with electron beam physical vapor deposition or sputter deposition.

ACCOMPANYING TECHNICAL INFORMATION TO TABLE ON DEPOSITION TECHNIQUES

1. ''Technology'' for pretreatments of the substrates listed in the Table, as follows:
a. Chemical stripping and cleaning bath cycle parameters, as follows:
1. Bath composition;
a. For the removal of old or defective coating corrosion product or foreign deposits;
b. For preparation of virgin substrates;
2. Time in bath;
3. Temperature of bath;
4. Number and sequences of wash cycles;
b. Visual and macroscopic criteria for acceptance of the cleaned part;
c. Heat treatment cycle parameters, as follows:
1. Atmosphere parameters, as follows:
a. Composition of the atmosphere;
b. Pressure of the atmosphere;
2. Temperature for heat treatment;
3. Time of heat treatment;
d. Substrate surface preparation parameters, as follows:
1. Grit blasting parameters, as follows:
a. Grit composition;
b. Grit size and shape;
c. Grit velocity;
2. Time and sequence of cleaning cycle after grit blast;
3. Surface finish parameters;
e. Masking technique parameters, as follows:
1. Material of mask;
2. Location of mask;
2. ''Technology'' for *in situ* quality assurance techniques for evaluation of the coating processes listed in the Table, as follows:
a. Atmosphere parameters, as follows:
1. Composition of the atmosphere;
2. Pressure of the atmosphere;
b. Time parameters;
c. Temperature parameters;
d. Thickness parameters;
e. Index of refraction parameters;
3. ''Technology'' for post deposition treatments of the coated substrates listed in the Table, as follows:
a. Shot peening parameters, as follows:
1. Shot composition;
2. Shot size;
3. Shot velocity;
b. Post shot peening cleaning parameters;
c. Heat treatment cycle parameters, as follows:
1. Atmosphere parameters, as follows:
a. Composition of the atmosphere;
b. Pressure of the atmosphere;
2. Time-temperature cycles;
d. Post heat treatment visual and macroscopic criteria for acceptance of the coated substrates;
4. ''Technology'' for quality assurance techniques for the evaluation of the coated substrates listed in the Table, as follows:
a. Statistical sampling criteria;
b. Microscopic criteria for:
1. Magnification;
2. Coating thickness, uniformity;
3. Coating integrity;
4. Coating composition;
5. Coating and substrates bonding;
6. Microstructural uniformity.
c. Criteria for optical properties assessment:
1. Reflectance;
2. Transmission;
3. Absorption;
4. Scatter;
5. ''Technology'' and parameters related to specific coating and surface modification processes listed in the Table, as follows:
a. For Chemical Vapor Deposition:
1. Coating source composition and formulation;
2. Carrier gas composition;
3. Substrate temperature;
4. Time-temperature-pressure cycles;
5. Gas control and part manipulation;
b. For Thermal Evaporation—Physical Vapor Deposition:
1. Ingot or coating material source composition;
2. Substrate temperature;
3. Reactive gas composition;
4. Ingot feed rate or material vaporization rate;
5. Time-temperature-pressure cycles;

6. Beam and part manipulation;
7. ''Laser'' parameters, as follows:
a. Wave length;
b. Power density;
c. Pulse length;
d. Repetition ratio;
e. Source;
f. Substrate orientation;
c. For Pack Cementation:
1. Pack composition and formulation;
2. Carrier gas composition;
3. Time-temperature-pressure cycles;
d. For Plasma Spraying:
1. Powder composition, preparation and size distribution;
2. Feed gas composition and parameters;
3. Substrate temperature;
4. Gun power parameters;
5. Spray distance;
6. Spray angle;
7. Cover gas composition, pressure and flow rates;
8. Gun control and part manipulation;
e. For Sputter Deposition:
1. Target composition and fabrication;
2. Geometrical positioning of part and target;
3. Reactive gas composition;
4. Electrical bias;
5. Time-temperature-pressure cycles;
6. Triode power;
7. Part manipulation;
f. For Ion Implantation:
1. Beam control and part manipulation;
2. Ion source design details;
3. Control techniques for ion beam and deposition rate parameters;
4. Time-temperature-pressure cycles.
g. For Ion Plating:
1. Beam control and part manipulation;
2. Ion source design details;
3. Control techniques for ion beam and deposition rate parameters;
4. Time-temperature-pressure cycles;
5. Coating material feed rate and vaporization rate;
6. Substrate temperature;
7. Substrate bias parameters.

2E018 "Technology" for the "use" of equipment controlled by 2B018.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
MT applies to ''technology'' for equipment controlled by 2B018 for MT reasons.	MT Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" controlled by 2B004, 2B009, 2B104, 2B109, 2B116, or 2D101.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 2B004, 2B104, 2B109, and 2B116.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: This entry controls only ''technology'' for 2B009 for spin forming machines combining the functions of spin forming and flow forming, and flow forming machines.
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E201 "Technology" according to the General Technology Note for the "use" of equipment or "software" controlled by 2A225, 2A226, 2B001, 2B006, 2B007.b, 2B007.c, 2B008, 2B009, 2B201, 2B204, 2B207, 2B209, 2B225 to 2B232, 2D201 or 2D202.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E290 "Technology" according to the General Technology Note for the "use" of equipment controlled by 2A290, 2A291, 2A292, 2A293, and 2B290.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E301 "Technology" according to the "General Technology Note" for "use" of items controlled by 2B350, 2B351 and 2B352.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The lists of items controlled are contained in the ECCN headings.

2E991 "Technology" for the "use" of equipment controlled by 2B991, 2B993, 2B996, or 2B997.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A.
Related Definitions: N/A.
Items: The list of items controlled is contained in the ECCN heading.

2E994 "Technology" for the "use" of portable electric generators controlled by 2A994.

LICENSE REQUIREMENTS

Reason for Control: AT
Control(s): AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya, and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §742.8 and §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A.
Related Definitions: N/A.
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere controlled by this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 3—Electronics

A. SYSTEMS, EQUIPMENT AND COMPONENTS

NOTE 1: The control status of equipment and components described in 3A001 or 3A002, other than those described in 3A001.a.3 to 3A001.a.10 or 3A001.a.12, which are specially designed for or which have the same functional characteristics as other equipment is determined by the control status of the other equipment.

NOTE 2: The control status of integrated circuits described in 3A001.a.3 to 3A001.a.9 or 3A001.a.12 that are unalterably programmed or designed for a specific function for other equipment is determined by the control status of the other equipment.

N.B.: When the manufacturer or applicant cannot determine the control status of the other equipment, the control status of the integrated circuits is determined in 3A001.a.3 to 3A001.a.9 and 3A001.a.12. If the integrated circuit is a silicon-based ''microcomputer microcircuit'' or microcontroller microcircuit described in 3A001.a.3 having an operand (data) word length of 8 bit or less, the control status of the integrated circuit is determined in 3A001.a.3.

3A001 Electronic components, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to 3A001.a.1.a	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A for MT
$1500: 3A001.c
$3000: 3A001.b.1, b.2, b.3, .d, .e and .f
$5000: 3A001.a, and .b.4 to b.7

GBS: Yes, except 3A001.a.1.a, b.1, b.3 to b.7, .c to .f

CIV: Yes, except 3A001.a.1, a.2, a.3.a (for processors with a CTP greater than 1200 Mtops), a.5, a.6, a.9, a.10, and a.12, .b, .c, .d, .e, and .f

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: See also 3A101, 3A201, and 3A991

Related Definitions: For the purposes of integrated circuits in 3A001.a.1, 5×10^3 Gy(Si)=5×10^5 Rads (Si); 5×10^6 Gy (Si)/s=5×10^8 Rads (Si)/s.

Items: a. General purpose integrated circuits, as follows:

NOTE 1: The control status of wafers (finished or unfinished), in which the function has been determined, is to be evaluated against the parameters of 3A001.a.

NOTE 2: Integrated circuits include the following types: ''Monolithic integrated circuits''; ''Hybrid integrated circuits''; ''Multichip integrated circuits''; ''Film type integrated circuits'', including silicon-on-sapphire integrated circuits; ''Optical integrated circuits''.

a.1. Integrated circuits, designed or rated as radiation hardened to withstand any of the following:

a.1.a. A total dose of 5×10^3 Gy (Si), or higher; *or*

a.1.b. A dose rate upset of 5×10^6 Gy (Si)/s, or higher;

a.2. Integrated circuits described in 3A001.a.3 to 3A001.a.10 or 3A001.a.12, electrical erasable programmable read-only memories (EEPROMs), flash memories and static random-access memories (SRAMs), having any of the following:

a.2.a. Rated for operation at an ambient temperature above 398 K (125° C);

a.2.b. Rated for operation at an ambient temperature below 218 K (−55° C); *or*

a.2.c. Rated for operation over the entire ambient temperature range from 218 K (−55° C) to 398 K (125° C);

NOTE: 3A001.a.2 does not apply to integrated circuits for civil automobiles or railway train applications.

a.3. ''Microprocessor microcircuits'', ''micro-computer microcircuits'' and microcontroller microcircuits, having any of the following characteristics:

NOTE: 3A001.a.3 includes digital signal processors, digital array processors and digital coprocessors.

a.3.a. A ''composite theoretical performance'' (''CTP'') of 260 million theoretical operations per second (Mtops) or more and an arithmetic logic unit with an access width of 32 bit or more;

a.3.b. Manufactured from a compound semiconductor and operating at a clock frequency exceeding 40 MHz; *or*

a.3.c. More than one data or instruction bus or serial communication port for external interconnection in a parallel processor with a transfer rate exceeding 2.5 Mbyte/s;

a.4. Storage integrated circuits manufactured from a compound semiconductor;

a.5. Analog-to-digital and digital-to-analog converter integrated circuits, as follows:

a.5.a. Analog-to-digital converters having any of the following:

a.5.a.1. A resolution of 8 bit or more, but less than 12 bit, with a total conversion time to maximum resolution of less than 10 ns;

a.5.a.2. A resolution of 12 bit with a total conversion time to maximum resolution of less than 200 ns; *or*

a.5.a.3. A resolution of more than 12 bit with a total conversion time to maximum resolution of less than 2 μs;

a.5.b. Digital-to-analog converters with a resolution of 12 bit or more, and a ''settling time'' of less than 10 ns;

a.6. Electro-optical and ''optical integrated circuits'' designed for ''signal processing'' having all of the following:

a.6.a. One or more than one internal ''laser'' diode;

a.6.b. One or more than one internal light detecting element; *and*

a.6.c. Optical waveguides;

a.7. Field programmable gate arrays having any of the following:

a.7.a. An equivalent usable gate count of more than 30,000 (2 input gates); *or*

a.7.b. A typical ''basic gate propagation delay time'' of less than 0.4 ns;

a.8. Field programmable logic arrays having any of the following:

a.8.a. An equivalent usable gate count of more than 30,000 (2 input gates); *or*

a.8.b. A toggle frequency exceeding 133 MHz;

a.9. Neural network integrated circuits;

a.10. Custom integrated circuits for which the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:

a.10.a. More than 208 terminals;

a.10.b. A typical ''basic gate propagation delay time'' of less than 0.35 ns; *or*

a.10.c. An operating frequency exceeding 3 GHz;

a.11. Digital integrated circuits, other than those described in 3A001.a.3 to 3A001.a.10 and

3A001.a.12, based upon any compound semiconductor and having any of the following:

a.11.a. An equivalent gate count of more than 300 (2 input gates); *or*

a.11.b. A toggle frequency exceeding 1.2 GHz;

a.12. Fast Fourier Transform (FFT) processors having any of the following:

a.12.a. A rated execution time for a 1,024 point complex FFT of less than 1 ms;

a.12.b. A rated execution time for an N-point complex FFT of other than 1,024 points of less than N log2 N /10,240 ms, where N is the number of points; *or*

a.12.c. A butterfly throughput of more than 5.12 MHz;

b. Microwave or millimeter wave components, as follows:

b.1. Electronic vacuum tubes and cathodes, as follows:

NOTE: 3A001.b.1 does not control tubes designed or rated to operate in the ITU allocated bands at frequencies not exceeding 31 GHz.

b.1.a. Travelling wave tubes, pulsed or continuous wave, as follows:

b.1.a.1. Operating at frequencies higher than 31 GHz;

b.1.a.2. Having a cathode heater element with a turn on time to rated RF power of less than 3 seconds;

b.1.a.3. Coupled cavity tubes, or derivatives thereof, with an ''instantaneous bandwidth'' of more than 7% or a peak power exceeding 2.5 kW;

b.1.a.4. Helix tubes, or derivatives thereof, with any of the following characteristics:

b.1.a.4.a. An ''instantaneous bandwidth'' of more than one octave, and average power (expressed in kW) times frequency (expressed in GHz) of more than 0.5;

b.1.a.4.b. An ''instantaneous bandwidth'' of one octave or less, and average power (expressed in kW) times frequency (expressed in GHz) of more than 1; *or*

b.1.a.4.c. Being ''space qualified'';

b.1.b. Crossed-field amplifier tubes with a gain of more than 17 dB;

b.1.c. Impregnated cathodes designed for electronic tubes, with any of the following:

b.1.c.1. A turn on time to rated emission of less than 3 seconds; *or*

b.1.c.2. Producing a continuous emission current density at rated operating conditions exceeding 5 A/cm^2;

b.2. Microwave integrated circuits or modules containing ''monolithic integrated circuits'' operating at frequencies exceeding 3 GHz;

NOTE: 3A001.b.2 does not control circuits or modules for equipment designed or rated to operate in the ITU allocated bands at frequencies not exceeding 31 GHz.

b.3. Microwave transistors rated for operation at frequencies exceeding 31 GHz;

b.4. Microwave solid state amplifiers, having any of the following:

b.4.a. Operating frequencies exceeding 10.5 GHz and an ''instantaneous bandwidth'' of more than half an octave; *or*

b.4.b. Operating frequencies exceeding 31 GHz;

b.5. Electronically or magnetically tunable band-pass or band-stop filters having more than 5 tunable resonators capable of tuning across a 1.5:1 frequency band (F_{max}/F_{min}) in less than 10 μs having any of the following:

b.5.a. A band-pass bandwidth of more than 0.5% of center frequency; *or*

b.5.b. A band-stop bandwidth of less than 0.5% of center frequency;

b.6. Microwave ''assemblies'' capable of operating at frequencies exceeding 31 GHz;

b.7. Mixers and converters designed to extend the frequency range of equipment described in 3A002.c, 3A002.e or 3A002.f beyond the limits stated therein;

b.8. Microwave power amplifiers containing tubes controlled by 3A001.b and having all of the following:

b.8.a. Operating frequencies above 3 GHz;

b.8.b. An average output power density exceeding 80 W/kg; *and*

b.8.c. A volume of less than 400 cm_3;

NOTE: 3A001.b.8 does not control equipment designed or rated for operation in an ITU allocated band.

c. Acoustic wave devices, as follows, and specially designed components therefor:

c.1. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (i.e., ''signal processing'' devices employing elastic waves in materials), having any of the following:

c.1.a. A carrier frequency exceeding 2.5 GHz;

c.1.b. A carrier frequency exceeding 1 GHz, but not exceeding 2.5 GHz, and having any of the following:

c.1.b.1. A frequency side-lobe rejection exceeding 55 dB;

c.1.b.2. A product of the maximum delay time and the bandwidth (time in μs and bandwidth in MHz) of more than 100;

c.1.b.3. A bandwidth greater than 250 MHz; *or*

c.1.b.4. A dispersive delay of more than 10 μs; *or*

c.1.c. A carrier frequency of 1 GHz or less, having any of the following:

c.1.c.1. A product of the maximum delay time and the bandwidth (time in μs and bandwidth in MHz) of more than 100;

c.1.c.2. A dispersive delay of more than 10 μs; *or*

c.1.c.3. A frequency side-lobe rejection exceeding 55 dB and a bandwidth greater than 50 MHz;

c.2. Bulk (volume) acoustic wave devices (i.e., ''signal processing'' devices employing elastic waves) that permit the direct processing of signals at frequencies exceeding 1 GHz;

c.3. Acoustic-optic ''signal processing'' devices employing interaction between acoustic waves (bulk wave or surface wave) and light waves that permit the direct processing of signals or images, including spectral analysis, correlation or convolution;

d. Electronic devices and circuits containing components, manufactured from ''superconductive'' materials specially designed for operation at temperatures below the ''critical temperature'' of at least one of the ''superconductive'' constituents, with any of the following:

d.1. Electromagnetic amplification:

d.1.a. At frequencies equal to or less than 31 GHz with a noise figure of less than 0.5 dB; *or*

d.1.b. At frequencies exceeding 31 GHz;

d.2. Current switching for digital circuits using ''superconductive'' gates with a product of delay time per gate (in seconds) and power dissipation per gate (in watts) of less than 10^{-14} J; *or*

d.3. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10,000;

e. High energy devices, as follows:

e.1. Batteries and photovoltaic arrays, as follows:

NOTE: 3A001.e.1 does not control batteries with volumes equal to or less than 27 cm^3 (e.g., standard C-cells or R14 batteries).

e.1.a. Primary cells and batteries having an energy density exceeding 480 Wh/kg and rated for operation in the temperature range from below 243 K (-30° C) to above 343 K (70° C);

e.1.b. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (-20° C) to above 333 K (60° C);

TECHNICAL NOTE: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75% of the open circuit voltage divided by the total mass of the cell (or battery) in kg.

e.1.c. ''Space qualified'' and radiation hardened photovoltaic arrays with a specific power exceeding 160 W/m^2 at an operating temperature of 301 K (28° C) under a tungsten illumination of 1 kW/m^2 at 2,800 K (2,527° C);

e.2. High energy storage capacitors, as follows:

N.B.: See also 3A201.a.

e.2.a. Capacitors with a repetition rate of less than 10 Hz (single shot capacitors) having all of the following:

e.2.a.1. A voltage rating equal to or more than 5 kV;

e.2.a.2. An energy density equal to or more than 250 J/kg; *and*

e.2.a.3. A total energy equal to or more than 25 kJ;

e.2.b. Capacitors with a repetition rate of 10 Hz or more (repetition rated capacitors) having all of the following:

e.2.b.1. A voltage rating equal to or more than 5 kV;

e.2.b.2. An energy density equal to or more than 50 J/kg;

e.2.b.3. A total energy equal to or more than 100 J; *and*

e.2.b.4. A charge/discharge cycle life equal to or more than 10,000;

e.3. ''Superconductive'' electromagnets and solenoids specially designed to be fully charged or discharged in less than one second, having all of the following:

N.B.: See also 3A201.b.

e.3.a. Energy delivered during the discharge exceeding 10 kJ in the first second;

e.3.b. Inner diameter of the current carrying windings of more than 250 mm; *and*

e.3.c. Rated for a magnetic induction of more than 8 T or ''overall current density'' in the winding of more than 300 A/mm^2;

NOTE: 3A001.e.3 does not control ''superconductive'' electromagnets or solenoids specially designed for Magnetic Resonance Imaging (MRI) medical equipment.

f. Rotary input type shaft absolute position encoders having any of the following:

f.1. A resolution of better than 1 part in 265,000 (18 bit resolution) of full scale; *or*

f.2. An accuracy better than ± 2.5 seconds of arc.

3A002 General purpose electronic equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $3000: 3A002.a, .e, .f, .g; $5000: 3A002.b to .d

GBS: Yes for 3A002.a.1.; 3A002.b (synthesized output frequency of 2.6 GHz or less and a ''frequency switching time'' of 0.3 ms or more); and 3A002.d (synthesized output frequency of 2.6 GHz or less and a ''frequency switching time'' of 0.3 ms or more)

CIV: Yes for 3A002.a.1 (provided all of the following conditions are met: (1) Bandwidths do not exceed: 4 MHz per track and have up to 28 tracks or 2 MHz per track and have up to 42 tracks; (2) Tape speed does not exceed 6.1 m/s; (3) They are not designed for underwater use; (4) They are not ruggedized for

military use; *and* (5) Recording density does not exceed 653.2 magnetic flux sine waves per mm); 3A002.b (synthesized output frequency of 2.6 GHz or less; and a ''frequency switching time'' of 0.3 ms or more), 3A002.d (synthesized output frequency of 2.6 GHz or less; and a ''frequency switching time'' of 0.3 ms or more).

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also 3A202 and 3A992
Related Definitions: N/A
Items: a. Recording equipment, as follows, and specially designed test tape therefor:

a.1. Analog instrumentation magnetic tape recorders, including those permitting the recording of digital signals (e.g., using a high density digital recording (HDDR) module), having any of the following:

a.1.a. A bandwidth exceeding 4 MHz per electronic channel or track;

a.1.b. A bandwidth exceeding 2 MHz per electronic channel or track and having more than 42 tracks; *or*

a.1.c. A time displacement (base) error, measured in accordance with applicable IRIG or EIA documents, of less than ± 0.1 μs;

NOTE: Analog magnetic tape recorders specially designed for civilian video purposes are not considered to be instrumentation tape recorders.

a.2. Digital video magnetic tape recorders having a maximum digital interface transfer rate exceeding 180 Mbit/s;

NOTE: 3A002.a.2 does not control digital video magnetic tape recorders specially designed for television recording using a signal format standardized or recommended by the CCIR or the IEC for civil television applications.

a.3. Digital instrumentation magnetic tape data recorders employing helical scan techniques or fixed head techniques, having any of the following:

a.3.a. A maximum digital interface transfer rate exceeding 175 Mbit/s; *or*

a.3.b. Being ''space qualified'';

NOTE: 3A002.a.3 does not control analog magnetic tape recorders equipped with HDDR conversion electronics and configured to record only digital data.

a.4. Equipment, having a maximum digital interface transfer rate exceeding 175 Mbit/s, designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;

a.5. Waveform digitizers and transient recorders having all of the following:

N.B.: See also 3A202.

a.5.a. Digitizing rates equal to or more than 200 million samples per second and a resolution of 10 bits or more; *and*

a.5.b. A continuous throughput of 2 Gbit/s or more;

TECHNICAL NOTE: For those instruments with a parallel bus architecture, the continuous throughput rate is the highest word rate multiplied by the number of bits in a word. Continuous throughput is the fastest data rate the instrument can output to mass storage without the loss of any information while sustaining the sampling rate and analog-to-digital conversion.

b. ''Frequency synthesizer'', ''assemblies'' having a ''frequency switching time'' from one selected frequency to another of less than 1 ms;

c. ''Signal analyzers'', as follows:

c.1. ''Signal analyzers'' capable of analyzing frequencies exceeding 31 GHz;

c.2. ''Dynamic signal analyzers'' having a ''real-time bandwidth'' exceeding 25.6 Khz;

NOTE: 3A002.c.2 does not control those ''dynamic signal analyzers'' using only constant percentage bandwidth filters.

TECHNICAL NOTE: Constant percentage bandwidth filters are also known as octave or fractional octave filters.

d. Frequency synthesized signal generators producing output frequencies, the accuracy and short term and long term stability of which are controlled, derived from or disciplined by the internal master frequency, and having any of the following:

d.1. A maximum synthesized frequency exceeding 31 GHz;

d.2. A ''frequency switching time'' from one selected frequency to another of less than 1 ms; *or*

d.3. A single sideband (SSB) phase noise better than $-(126+20\log_{10}F-20\log_{10}f)$ in dBc/Hz, where F is the off-set from the operating frequency in Hz and f is the operating frequency in MHz;

NOTE: 3A002.d does not control equipment in which the output frequency is either produced by the addition or subtraction of two or more crystal oscillator frequencies, or by an addition or subtraction followed by a multiplication of the result.

e. Network analyzers with a maximum operating frequency exceeding 40 GHz;

f. Microwave test receivers having all of the following:

f.1. A maximum operating frequency exceeding 40 GHz; *and*

f.2. Being capable of measuring amplitude and phase simultaneously;

g. Atomic frequency standards having any of the following:

g.1. Long-term stability (aging) less (better) than 1×10^{-11}/month; *or*

g.2. Being ''space qualified''.

NOTE: 3A002.g.1 does not control non-''space qualified'' rubidium standards.

3A101 Electronic equipment, devices and components, other than those controlled

by 3A001, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: Items controlled in 3A101.a are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121).
Related Definitions: N/A
Items: a. Analog-to-digital converters, usable in ''missiles'', designed to meet military specifications for ruggedized equipment;

b. Accelerators capable of delivering electromagnetic radiation produced by bremsstrahlung from accelerated electrons of 2 MeV or greater, and systems containing those accelerators.

NOTE: 3A101.b above does not include equipment specially designed for medical purposes.

3A201 Electronic components, other than those controlled by 3A001, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: This entry does not control magnets that are specially designed for and exported as parts of medical nuclear magnetic resonance (NMR) imaging systems. Such parts may be exported in separate shipments from different sources, provided that the related export control documents clearly specify that the parts are for medical NMR imaging systems that are being exported.
Related Definition: N/A
Items: a. Capacitors with the following characteristics:

a.1. Voltage rating greater than 1.4 kV, energy storage greater than 10 J, capacitance greater than 0.5 µF and series inductance less than 50 Nh; *or*

a.2. Voltage rating greater than 750 V, capacitance greater than 0.25 µF and series inductance less than 10 Nh;

b. Superconducting solenoidal electromagnets with all of the following characteristics:

b.1. Capable of creating magnetic fields of more than 2 teslas (20 kilogauss);

b.2. With an L/D ratio (length divided by inner diameter) greater than 2;

b.3. With an inner diameter of more than 300 mm; *and*

b.4. With a magnetic field uniform to better than 1% over the central 50% of the inner volume;

NOTE: 3A201.b does not specify magnets specially designed for and exported as parts of medical nuclear magnetic resonance (NMR) imaging systems. The phrase ''as part of'' does not necessarily mean physical part in the same shipment; separate shipments from different sources are allowed, provided the related export documents clearly specify that the shipments are dispatched ''as part of'' the imaging systems.

c. Flash X-ray generators or pulsed electron accelerators with peak energy of 500 keV or greater, as follows, except accelerators that are component parts of devices designed for purposes other than electron beam or X-ray radiation (electron microscopy, for example) and those designed for medical purposes:

c.1. Having an accelerator peak electron energy of 500 keV or greater but less than 25 MeV and with a figure of merit (K) of 0.25 or greater, where K is defined as:

K=1.7×103V2.65Q, where V is the peak electron energy in million electron volts and Q is the total accelerated charge in coulombs if the accelerator beam pulse duration is less than or equal to 1 microsecond; if the accelerator beam pulse duration is greater than 1 microsecond, Q is the maximum accelerated charge in 1 microsecond {Q equals the integral of i with respect to t, over the lesser of 1 microsecond or the time duration of the beam pulse (Q={integral} idt), where i is beam current in amperes and t is time in seconds}; *or*

c.2. Having an accelerator peak electron energy of 25 MeV or greater and a peak power greater than 50 MW. {Peak power = (peak potential in volts) × (peak beam current in amperes)}.

TECHNICAL NOTES: a. Time duration of the beam pulse—In machines, based on microwave accelerating cavities, the time duration of the beam pulse is the lesser of 1 microsecond or the duration of the bunched beam packet resulting from one microwave modulator pulse.

b. Peak beam current—In machines based on microwave accelerating cavities, the peak

beam current is the average current in the time duration of a bunched beam packet.

3A225 Frequency changers (also known as converters or inverters) or generators, other than those controlled by 0B001.c.11, having all of the characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: Frequency changers (also known as converters or inverters) especially designed or prepared to supply motor stators and having the characteristics described in 3A225.b and .d, together with a total harmonic distortion of less than 2 percent and an efficiency of greater than 80 percent are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definition: Motor stators are especially designed or prepared ring-shaped stators for high-speed multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600 Hz to 2,000 Hz, and a power range of 50 VA to 1,000 VA. The stators consist of multiphase windings on a laminated low-loss iron core comprising thin layers typically to 2.0 mm (.008 in) thick or less.
Items: a. A multiphase output capable of providing a power of 40 W or more;

b. Capable of operating in the frequency range between 600 and 2000 Hz;

c. Total harmonic distortion below 10%; *and*

d. Frequency control better than 0.1%.

3A226 Direct current high-power supplies, other than those controlled by 0B001.j.6, capable of continuously producing, over a time period of 8 hours, 100 V or greater with current output of 500 A or greater and with current or voltage regulation better than 0.1%.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A227 High-voltage direct current power supplies, other than those controlled by 0B001.j.5, capable of continuously producing, over a time period of 8 hours, 20,000 V or greater with current output of 1 A or greater and with current or voltage regulation better than 0.1%.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A228 Switching devices, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Cold-cathode tubes (including gas krytron tubes and vacuum sprytron tubes), whether gas filled or not, operating similarly to a spark gap, containing three or more electrodes, and having all of the following characteristics:

a.1. Anode peak voltage rating of 2,500 V or more;

a.2. Anode peak current rating of 100 A or more; *and*

a.3. Anode delay time of 10 microsecond or less;

b. Triggered spark-gaps having an anode delay time of 15 microsecond or less and rated for a peak current of 500 A or more;

c. Modules or assemblies with a fast switching function having all of the following characteristics:

c.1. Anode peak voltage rating greater than 2,000 V;

c.2. Anode peak current rating of 500 A or more; and

c.3. Turn-on time of 1 microsecond or less.

3A229 Firing sets and equivalent high-current pulse generators (for detonators controlled by 3A232), as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also U.S. Munitions List
Related Definitions: N/A
Items: a. Explosive detonator firing sets designed to drive multiple controlled detonators controlled by 3A232;

b. Modular electrical pulse generators (pulsers) designed for portable, mobile or ruggedized use (including xenon flash-lamp drivers) having all the following characteristics:

b.1. Capable of delivering their energy in less than 15 microsecond;

b.2. Having an output greater than 100 A;

b.3. Having a rise time of less than 10 microsecond into loads of less than 40 ohms (rise time is the time interval from 10% to 90% current amplitude when driving a resistive load);

b.4. Enclosed in a dust-tight enclosure;

b.5. No dimension greater than 254 mm;

b.6. Weight less than 25 kg; *and*

b.7. Specified for use over an extended temperature range 223 K (−50° C) to 373 K (100° C) or specified as suitable for aerospace use.

3A230 High-speed pulse generators with output voltages greater than 6 volts into a less than 55 ohm resistive load, and with pulse transition times less than 500 picoseconds.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: In this entry, ''pulse transition time'' is defined as the time interval between 10% and 90% voltage amplitude.
Items: The list of items controlled is contained in the ECCN heading.

3A231 Neutron generator systems, including tubes, designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number, parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A232 Detonators and multipoint initiation systems, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: This entry does not control detonators using only primary explosives, such as lead azide.
Related Definition: The detonators of concern all utilize a small electrical conductor (bridge, bridge wire or foil) that explosively vaporizes when a fast, high-current

electrical pulse is passed through it. In nonslapper types, the exploding conductor starts a chemical detonation in a contacting high-explosive material such as PETN (Pentaerythritoltetranitrate). In slapper detonators, the explosive vaporization of the electrical conductor drives a flyer or slapper across a gap and the impact of the slapper on an explosive starts a chemical detonation. The slapper in some designs is driven by a magnetic force. The term exploding foil detonator may refer to either an EB or a slapper-type detonator. Also, the word initiator is sometimes used in place of the word detonator.

Items: a. Electrically driven explosive detonators, the following:

a.1. Exploding bridge (EB);

a.2. Exploding bridge wire (EBW);

a.3. Slapper;

a.4. Exploding foil initiators (EFI);

b. Arrangements using single or multiple detonators designed to nearly simultaneously initiate an explosive surface (over greater than 5000 mm^2) from a single firing signal (with an initiation timing spread over the surface of less than 2.5 microseconds).

3A233 Mass spectrometers, other than those controlled by 0B002.g, capable of measuring ions of 230 atomic mass units or greater and having a resolution of better than 2 parts in 230, and ion sources therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: Specially designed or prepared magnetic or quadruple mass spectrometers that have the following characteristics and are capable of taking on-line samples of feed, product, or tails from UF_6 gas streams are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.): (a) Unit resolution for mass greater than 320; (b) Ion sources that are constructed of or lined with nichrome or that are monel or nickel-plated; (c) Electron bombardment ionization sources; (d) Having a collector system suitable for isotopic analysis.

Related Definitions: N/A

Items: a. Inductively coupled plasma mass spectrometers (ICP/MS);

b. Glow discharge mass spectrometers (GDMS);

c. Thermal ionization mass spectrometers (TIMS);

d. Electron bombardment mass spectrometers that have a source chamber constructed from, lined with or plated with materials resistant to UF_6;

e. Molecular beam mass spectrometers as follows:

e.1. Having a source chamber constructed from, lined with or plated with stainless steel or molybdenum and have a cold trap capable of cooling to 193 K (−80° C) or less; or

e.2. Having a source chamber constructed from, lined with or plated with materials resistant to UF_6; or

f. Mass spectrometers equipped with a microfluorination ion source designed for use with actinides or actinide fluorides.

3A292 Oscilloscopes and transient recorders other than those controlled by 3A002.a.5, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: N/A

Related Definitions: ''Bandwidth'' is defined as the band of frequencies over which the deflection on the cathode ray tube does not fall below 70.7% of that at the maximum point measured with a constant input voltage to the oscilloscope amplifier.

Items: a. Non-modular analog oscilloscopes having a bandwidth of 1 GHz or greater;

b. Modular analog oscilloscope systems having either of the following characteristics:

b.1. A mainframe with a bandwidth of 1 GHz or greater; *or*

b.2. Plug-in modules with an individual bandwidth of 4 GHz or greater;

c. Analog sampling oscilloscopes for the analysis of recurring phenomena with an effective bandwidth greater than 4 GHz;

d. Digital oscilloscopes and transient recorders, using analog-to-digital conversion techniques, capable of storing transients by sequentially sampling single-shot inputs at successive intervals of less than 1 ns (greater than 1 giga-sample per second), digitizing to 8 bits or greater resolution and storing 256 or more samples.

NOTE: Specially designed components controlled by this item are the following, for analog oscilloscopes:

1. Plug-in units;
2. External amplifiers;
3. Pre-amplifiers;
4. Sampling devices;
5. Cathode ray tubes.

3A980 Voice print identification and analysis equipment and parts, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A981 Polygraphs (except biomedical recorders designed for use in medical facilities for monitoring biological and neurophysical responses); fingerprint analyzers, cameras and equipment, n.e.s.; automated fingerprint and identification retrieval systems, n.e.s.; psychological stress analysis equipment; electronic monitoring restraint devices; and specially designed parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A991 Electronic devices and components not controlled by 3A001.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Microprocessor microcircuits'', ''microcomputer microcircuits'', and microcontroller microcircuits having a clock frequency exceeding 25 MHz;

b. Storage integrated circuits, as follows:

b.1. Electrical erasable programmable read-only memories (EEPROMs) with a storage capacity;

b.1.a. Exceeding 16 Mbits per package for flash memory types; *or*

b.1.b. Exceeding either of the following limits for all other EEPROM types:

b.1.b.1. Exceeding 1 Mbit per package; *or*

b.1.b.2. Exceeding 256 kbit per package and a maximum access time of less than 80 ns;

b.2. Static random access memories (SRAMs) with a storage capacity:

b.2.a. Exceeding 1 Mbit per package; *or*

b.2.b. Exceeding 256 kbit per package and a maximum access time of less than 25 ns;

c. Field programmable logic arrays having either of the following:

c.1. An equivalent gate count of more than 5000 (2 input gates); *or*

c.2. A toggle frequency exceeding 100 MHz;

d. Custom integrated circuits for which either the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:

d.1. More than 144 terminals; or

d.2. A typical ''basic propagation delay time'' of less than 0.4 ns.

e. Travelling wave tubes, pulsed or continuous wave, as follows:

e.1. Coupled cavity tubes, or derivatives thereof;

e.2. Helix tubes, or derivatives thereof, with any of the following:

e.2.a.1. An ''instantaneous bandwidth'' of half an octave or more; and

e.2.a.2. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.2;

e.2.b.1 An ''instantaneous bandwidth'' of less than half an octave; and

e.2.b.2. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.4;

f. Flexible waveguides designed for use at frequencies exceeding 40 GHz;

g. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (i.e., ''signal processing'' devices employing

elastic waves in materials), having either of the following:

g.1. A carrier frequency exceeding 1 GHz; or

g.2. A carrier frequency of 1 GHz or less; and

g.2.a. A frequency side-lobe rejection exceeding 55 dB;

g.2.b. A product of the maximum delay time and bandwidth (time in microseconds and bandwidth in MHz) of more than 100; or

g.2.c. A dispersive delay of more than 10 microseconds.

h. Batteries, as follows:

NOTE: 3A991.h does not control batteries with volumes equal to or less than 26 cm^3 (e.g., standard C-cells or UM–2 batteries).

h.1. Primary cells and batteries having an energy density exceeding 350 Wh/kg and rated for operation in the temperature range from below 243 K (−30° C) to above 343 K (70° C);

h.2. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (−20° C) to above 333 K (60° C);

TECHNICAL NOTE: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75 percent of the open circuit voltage divided by the total mass of the cell (or battery) in kg.

i. ''Superconductive'' electromagnets or solenoids specially designed to be fully charged or discharged in less than one minute, having all of the following:

NOTE: 3A991.i does not control ''superconductive'' electromagnets or solenoids designed for Magnetic Resonance Imaging (MRI) medical equipment.

i.1. Maximum energy delivered during the discharge divided by the duration of the discharge of more than 500 kJ per minute;

i.2. Inner diameter of the current carrying windings of more than 250 mm; and

i.3. Rated for a magnetic induction of more than 8T or ''overall current density'' in the winding of more than 300 A/mm^2.

j. Circuits or systems for electromagnetic energy storage, containing components manufactured from ''superconductive'' materials specially designed for operation at temperatures below the ''critical temperature'' of at least one of their ''superconductive'' constituents, having all of the following:

j.1. Resonant operating frequencies exceeding 1 MHz;

j.2. A stored energy density of 1 MJ/M^3 or more; and

j.3. A discharge time of less than 1 ms;

k. Hydrogen/hydrogen-isotope thyratrons of ceramic-metal construction and rate for a peak current of 500 A or more.

3A992 General purpose electronic equipment not controlled by 3A002.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1000 for Syria for .a only
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Electronic test equipment, n.e.s.

b. Digital instrumentation magnetic tape data recorders having any of the following characteristics;

b.1. A maximum digital interface transfer rate exceeding 60 Mbit/s and employing helical scan techniques;

b.2. A maximum digital interface transfer rate exceeding 120 Mbit/s and employing fixed head techniques; or

b.3. ''Space qualified'';

c. Equipment, with a maximum digital interface transfer rate exceeding 60 Mbit/s, designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

3B001 Equipment for the manufacturing of semiconductor devices or materials and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes, except 3B001. a.2 and a.3; and for equipment controlled under 3B001.e, they cannot be connected to equipment controlled by 3B001.a.2, a.3, and .f.
CIV: Yes for equipment controlled by 3B001.a.1

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: See also 3B991
Related Definitions: N/A
Items: a. ''Stored program controlled'' equipment designed for epitaxial growth, as follows:

a.1. Equipment capable of producing a layer thickness uniform to less than ± 2.5% across a distance of 75 mm or more;

a.2. Metal organic chemical vapor deposition (MOCVD) reactors specially designed for compound semiconductor crystal growth by the chemical reaction between materials controlled by 3C003 or 3C004;

a.3. Molecular beam epitaxial growth equipment using gas sources;

b. ''Stored program controlled'' equipment designed for ion implantation, having any of the following:

b.1. An accelerating voltage exceeding 200 keV;

b.2. Being specially designed and optimized to operate at an accelerating voltage of less than 10 keV;

b.3. Direct write capability; or

b.4. Being capable of high energy oxygen implant into a heated semiconductor material ''substrate'';

c. ''Stored program controlled'' anisotropic plasma dry etching equipment, as follows:

c.1. Equipment with cassette-to-cassette operation and load-locks, and having any of the following:

c.1.a. Magnetic confinement; or

c.1.b. Electron cyclotron resonance (ECR);

c.2. Equipment specially designed for equipment controlled by 3B001.e. and having any of the following:

c.2.a. Magnetic confinement; or

c.2.b. ECR;

d. ''Stored program controlled'' plasma enhanced CVD equipment, as follows:

d.1. Equipment with cassette-to-cassette operation and load-locks, and having any of the following:

d.1.a. Magnetic confinement; or

d.1.b. ECR;

d.2. Equipment specially designed for equipment controlled by 3B001.e. and having any of the following:

d.2.a. Magnetic confinement; or

d.2.b. ECR;

e. ''Stored program controlled'' automatic loading multi-chamber central wafer handling systems, having all of the following:

e.1. Interfaces for wafer input and output, to which more than two pieces of semiconductor processing equipment are to be connected; and

e.2. Designed to form an integrated system in a vacuum environment for sequential multiple wafer processing;

NOTE: 3B001.e. does not control automatic robotic wafer handling systems not designed to operate in a vacuum environment.

f. ''Stored program controlled'' lithography equipment, as follows:

f.1. Align and expose step and repeat equipment for wafer processing using photo-optical or X-ray methods, having any of the following:

f.1.a. A light source wavelength shorter than 400 nm; *or*

f.1.b. Capable of producing a pattern with a minimum resolvable feature size of 0.7 µm or less;

NOTE: The minimum resolvable feature size is calculated by the following formula:

$$MRF = \frac{(\text{an exposure light source wavelength in } \mu m) \times (\text{K factor})}{\text{numerical aperture}}$$

Where the K factor = 0.7.
MRF = minimum resolvable feature size.

f.2. Equipment specially designed for mask making or semiconductor device processing using deflected focussed electron beam, ion beam or ''laser'' beam, having any of the following:

f.2.a. A spot size smaller than 0.2 µm;

f.2.b. Being capable of producing a pattern with a feature size of less than 1 µm; or

f.2.c. An overlay accuracy of better than ± 0.20 µm (3 sigma);

g. Masks and reticles designed for integrated circuits controlled by 3A001;

h. Multi-layer masks with a phase shift layer.

3B002 "Stored program controlled" test equipment, specially designed for testing finished or unfinished semiconductor devices and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also 3B992
Related Definitions: N/A
Items: a. For testing S-parameters of transistor devices at frequencies exceeding 31 GHz;

b. For testing integrated circuits capable of performing functional (truth table) testing at a pattern rate of more than 60 MHz;

NOTE: 3B002.b does not control test equipment specially designed for testing:

1. ''Assemblies'' or a class of ''assemblies'' for home or entertainment applications;

2. Uncontrolled electronic components, ''assemblies'' or integrated circuits.

c. For testing microwave integrated circuits at frequencies exceeding 3 GHz;

NOTE: 3B002.c does not control test equipment specially designed for testing microwave integrated circuits for equipment designed or rated to operate in the ITU allocated bands at frequencies not exceeding 31 GHz.

d. Electron beam systems designed for operation at 3 keV or below, or ''laser'' beam systems, for the non-contactive probing of powered-up semiconductor devices, having all of the following:

d.1. Stroboscopic capability with either beam-blanking or detector strobing; and

d.2. An electron spectrometer for voltage measurement with a resolution of less than 0.5 V.

NOTE: 3B002.d does not control scanning electron microscopes, except when specially designed and instrumented for the non-contactive probing of powered-up semiconductor devices.

3B991 Equipment not controlled by 3B001 for the manufacture of electronic components and materials, and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Equipment specially designed for the manufacture of electron tubes, optical elements and specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the manufacture of semiconductor devices, integrated circuits and ''assemblies'', as follows, and systems incorporating or having the characteristics of such equipment:

NOTE: 3B991.b also controls equipment used or modified for use in the manufacture of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

b.1. Equipment for the processing of materials for the manufacture of devices and components as specified in the heading of 3B991.b, as follows:

NOTE: 3B991 does not control quartz furnace tubes, furnace liners, paddles, boats (except specially designed caged boats), bubblers, cassettes or crucibles specially designed for the processing equipment controlled by 3B991.b.1.

b.1.a. Equipment for producing polycrystalline silicon and materials controlled by 3C001;

b.1.b. Equipment specially designed for purifying or processing III/V and II/VI semiconductor materials controlled by 3C001, 3C002, 3C003, or 3C004, except crystal pullers, for which see 3B991.b.1.c below;

b.1.c. Crystal pullers and furnaces, as follows:

NOTE: 3B991.b.1.c does not control diffusion and oxidation furnaces.

b.1.c.1. Annealing or recrystallizing equipment other than constant temperature furnaces employing high rates of energy transfer capable of processing wafers at a rate exceeding 0.005 m^2 per minute;

b.1.c.2. ''Stored program controlled'' crystal pullers having any of the following characteristics:

b.1.c.2.a. Rechargeable without replacing the crucible container;

b.1.c.2.b. Capable of operation at pressures above 2.5×10^5 Pa; *or*

b.1.c.2.c. Capable of pulling crystals of a diameter exceeding 100 mm;

b.1.d. ''Stored program controlled'' equipment for epitaxial growth having any of the following characteristics:

b.1.d.1. Capable of producing a layer thickness uniformity across the wafer of equal to or better than ±3.5%;

b.1.d.2. Rotation of individual wafers during processing; *or*

b.1.e. Molecular beam epitaxial growth equipment;

b.1.f. ''Magnetically enhanced'' ''sputtering'' equipment with specially designed integral load locks capable of transferring wafers in an isolated vacuum environment;

b.1.g. Equipment specially designed for ion implantation, ion-enhanced or photo-enhanced diffusion, having any of the following characteristics:

b.1.g.1. Patterning capability;

b.1.g.2. Accelerating voltage for more than 200 keV; *or*

b.1.g.3. Capable of high energy oxygen implant into a heated ''substrate'';

b.1.h. ''Stored program controlled'' equipment for the selective removal (etching) by means of anisotropic dry methods (e.g., plasma), as follows:

b.1.h.1. Batch types having either of the following:

b.1.h.1.a. End-point detection, other than optical emission spectroscopy types; or

b.1.h.1.b. Reactor operational (etching) pressure of 26.66 Pa or less;

b.1.h.2. Single wafer types having any of the following:

b.1.h.2.a. End-point detection, other than optical emission spectroscopy types;

b.1.h.2.b. Reactor operational (etching) pressure of 26.66 Pa or less; or

b.1.h.2.c. Cassette-to-cassette and load locks wafer handling;

NOTES: 1. ''Batch types'' refers to machines not specially designed for production processing of single wafers. Such machines can process two or more wafers simultaneously with common process parameters, e.g., RF power, temperature, etch gas species, flow rates.

2. ''Single wafer types'' refers to machines specially designed for production processing of single wafers. These machines may use automatic wafer handling techniques to load a single wafer into the equipment for processing. The definition includes equipment that can load and process several wafers but where the etching parameters, e.g., RF power or end point, can be independently determined for each individual wafer.

b.1.i. ''Chemical vapor deposition'' (CVD) equipment, e.g., plasma-enhanced CVD (PECVD) or photo-enhanced CVD, for semiconductor device manufacturing, having either of the following capabilities, for deposition of oxides, nitrides, metals or polysilicon:

b.1.i.1. ''Chemical vapor deposition'' equipment operating below 105 Pa; *or*

b.1.i.2. PECVD equipment operating either below 60 Pa (450 millitorr) or having automatic cassette-to-cassette and load lock wafer handling;

NOTE: 3B991.b.1.i does not control low pressure ''chemical vapor deposition'' (LPCVD) systems or reactive ''sputtering'' equipment.

b.1.j. Electron beam systems specially designed or modified for mask making or semiconductor device processing having any of the following characteristics:

b.1.j.1. Electrostatic beam deflection;

b.1.j.2. Shaped, non-Gaussian beam profile;

b.1.j.3. Digital-to-analog conversion rate exceeding 3 MHz;

b.1.j.4. Digital-to-analog conversion accuracy exceeding 12 bit; *or*

b.1.j.5. Target-to-beam position feedback control precision of 1 micrometer or finer;

NOTE: 3B991.b.1.j does not control electron beam deposition systems or general purpose scanning electron microscopes.

b.1.k. Surface finishing equipment for the processing of semiconductor wafers as follows:

b.1.k.1. Specially designed equipment for backside processing of wafers thinner than 100 micrometer and the subsequent separation thereof; *or*

b.1.k.2. Specially designed equipment for achieving a surface roughness of the active surface of a processed wafer with a two-sigma value of 2 micrometer or less, total indicator reading (TIR);

NOTE: 3B991.b.1.k does not control single-side lapping and polishing equipment for wafer surface finishing.

b.1.l. Interconnection equipment which includes common single or multiple vacuum chambers specially designed to permit the integration of any equipment controlled by 3B991 into a complete system;

b.1.m. ''Stored program controlled'' equipment using ''lasers'' for the repair or trimming of ''monolithic integrated circuits'' with either of the following characteristics:

b.1.m.1. Positioning accuracy less than ±1 micrometer; *or*

b.1.m.2. Spot size (kerf width) less than 3 micrometer.

b.2. Masks, mask ''substrates'', mask-making equipment and image transfer equipment for the manufacture of devices and components as specified in the heading of 3B991, as follows:

NOTE: The term ''masks'' refers to those used in electron beam lithography, X-ray lithography, and ultraviolet lithography, as well as the usual ultraviolet and visible photo-lithography.

b.2.a. Finished masks, reticles and designs therefor, except:

b.2.a.1. Finished masks or reticles for the production of unembargoed integrated circuits; *or*

b.2.a.2. Masks or reticles, having both of the following characteristics:

b.2.a.2.a. Their design is based on geometries of 2.5 micrometer or more; and

b.2.a.2.b. The design does not include special features to alter the intended use by means of production equipment or ''software'';

b.2.b. Mask ''substrates'' as follows:

b.2.b.1. Hard surface (e.g., chromium, silicon, molybdenum) coated ''substrates'' (e.g., glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 125 mm × 125 mm; *or*

b.2.b.2. ''Substrates'' specially designed for X-ray masks;

b.2.c. Equipment, other than general purpose computers, specially designed for computer aided design (CAD) of semiconductor devices or integrated circuits;

b.2.d. Equipment or machines, as follows, for mask or reticle fabrication:

b.2.d.1. Photo-optical step and repeat cameras capable of producing arrays larger than 100 mm × 100 mm, or capable of producing a single exposure larger than 6 mm × 6 mm in the image (i.e., focal) plane, or capable of producing line widths of less than 2.5 micrometer in the photoresist on the ''substrate'';

b.2.d.2. Mask or reticle fabrication equipment using ion or ''laser'' beam lithography capable of producing line widths of less than 2.5 micrometer; or

b.2.d.3. Equipment or holders for altering masks or reticles or adding pellicles to remove defects;

NOTE: 3B991.b.2.d.1 and b.2.d.2 do not control mask fabrication equipment using photo-optical methods which was either commercially available before the 1st January, 1980, or has a performance no better than such equipment.

b.2.e. ''Stored program controlled'' equipment for the inspection of masks, reticles or pellicles with:

b.2.e.1. A resolution of 0.25 micrometer or finer; and

b.2.e.2. A precision of 0.75 micrometer or finer over a distance in one or two coordinates of 63.5 mm or more;

NOTE: 3B991.b.2.e does not control general purpose scanning electron microscopes except when specially designed and instrumented for automatic pattern inspection.

b.2.f. Align and expose equipment for wafer production using photo-optical methods, including both projection image transfer equipment and step and repeat equipment, capable of performing any of the following functions:

NOTE: 3B991.b.2.f does not control photo-optical contact and proximity mask align and expose equipment or contact image transfer equipment.

b.2.f.1. Production of a pattern size of less than 2.5 micrometer;

b.2.f.2. Alignment with a precision finer than ± 0.25 micrometer (3 sigma); or

b.2.f.3. Machine-to-machine overlay no better than ± 0.3 micrometer;

b.2.g. Electron beam, ion beam or X-ray equipment for projection image transfer capable of producing patterns less than 2.5 micrometer;

NOTE: For focussed, deflected-beam systems (direct write systems), see 3B991.b.1.j or b.10.

b.2.h. Equipment using ''lasers'' for direct write on wafers capable of producing patterns less than 2.5 micrometer.

b.3. Equipment for the assembly of integrated circuits, as follows:

b.3.a. ''Stored program controlled'' die bonders having all of the following characteristics:

b.3.a.1. Specially designed for ''hybrid integrated circuits'';

b.3.a.2. X–Y stage positioning travel exceeding 37.5 × 37.5 mm; and

b.3.a.3. Placement accuracy in the X–Y plane of finer than ± 10 micrometer;

b.3.b. ''Stored program controlled'' equipment for producing multiple bonds in a single operation (e.g., beam lead bonders, chip carrier bonders, tape bonders);

b.3.c. Semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages controlled by 3A001 and that have a throughput equal to or more than one package per minute.

NOTE: 3B991.b.3 does not control general purpose resistance type spot welders.

b.4. Filters for clean rooms capable of providing an air environment of 10 or less particles of 0.3 micrometer or smaller per 0.02832 m^3 and filter materials therefor;

3B992 Equipment not controlled by 3B002 for the inspection or testing of electronic components and materials, and specially designed components and accessories therefor;

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Equipment specially designed for the inspection or testing of electron tubes, optical elements and specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the inspection or testing of semiconductor devices, integrated circuits and ''assemblies'', as follows, and systems incorporating or having the characteristics of such equipment:

NOTE: 3B992.b also controls equipment used or modified for use in the inspection or testing of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

b.1. ''Stored program controlled'' inspection equipment for the automatic detection of defects, errors or contaminants of 0.6 micrometer or less in or on processed wafers, ''substrates'', other than printed circuit boards or chips, using optical image acquisition techniques for pattern comparison;

NOTE: 3B992.b.1 does not control general purpose scanning electron microscopes, except when specially designed and instrumented for automatic pattern inspection.

b.2. Specially designed ''stored program controlled'' measuring and analysis equipment, as follows:

b.2.a. Specially designed for the measurement of oxygen or carbon content in semiconductor materials;

b.2.b. Equipment for line width measurement with a resolution of 1 micrometer or finer;

b.2.c. Specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 micrometer or less with a resolution of 1 micrometer or finer.

b.3. ''Stored program controlled'' wafer probing equipment having any of the following characteristics:

b.3.a. Positioning accuracy finer than 3.5 micrometer;

b.3.b. Capable of testing devices having more than 68 terminals; *or*

b.3.c. Capable of testing at a frequency exceeding 1 GHz;

b.4. Test equipment as follows:

b.4.a. ''Stored program controlled'' equipment specially designed for testing discrete semiconductor devices and unencapsulated dice, capable of testing at frequencies exceeding 18 GHz;

TECHNICAL NOTE: Discrete semiconductor devices include photocells and solar cells.

b.4.b. ''Stored program controlled'' equipment specially designed for testing integrated circuits and ''assemblies'' thereof, capable of functional testing:

b.4.b.1. At a pattern rate exceeding 20 MHz; or

b.4.b.2. At a pattern rate exceeding 10 MHz but not exceeding 20 MHz and capable of testing packages of more than 68 terminals;

NOTE: 3B992.b.4.b does not control equipment specially designed for testing integrated circuits not controlled by 3A001 or 3A991.

NOTES: 1. 3B992.b.4.b does not control test equipment specially designed for testing ''assemblies'' or a class of ''assemblies'' for home and entertainment applications.

2. 3B992.b.4.b does not control test equipment specially designed for testing electronic components, ''assemblies'' and integrated circuits not controlled by 3A001 or 3A991 provided such test equipment does not incorporate computing facilities with ''user accessible programmability''.

b.4.c. Equipment specially designed for determining the performance of focal-plane arrays at wavelengths of more than 1,200 nm, using ''stored program controlled'' measurements or computer aided evaluation and having any of the following characteristics:

b.4.c.1. Using scanning light spot diameters of less than 0.12 mm;

b.4.c.2. Designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; or

b.4.c.3. Designed for evaluating arrays capable of creating images with more than 32 × 32 line elements;

b.5. Electron beam test systems, capable of operating at or below 3,000 eV, for non-contactive probing of powered-up semiconductor devices having any of the following:

b.5.a. Stroboscopic capability with either beam blanking or detector strobing;

b.5.b. An electron spectrometer for voltage measurements with a resolution of less than 0.5 V; or

b.5.c. Electrical tests fixtures for performance analysis of integrated circuits;

NOTE: 3B992.b.5 does not control scanning electron microscopes, except when specially designed and instrumented for non-contactive probing of a powered-up semiconductor device.

b.6. ''Stored program controlled'' multifunctional focused ion beam systems specially designed for manufacturing, repairing, physical layout analysis and testing of masks or semiconductor devices and having either of the following characteristics:

b.6.a. Target-to-beam position feedback control precision of 1 micrometer or finer; or

b.6.b. Digital-to-analog conversion accuracy exceeding 12 bit;

b.7. Particle measuring systems employing ''lasers'' designed for measuring particle size and concentration in air having both of the following characteristics:

b.7.a. Capable of measuring particle sizes of 0.2 micrometer or less at a flow rate of 0.02832 m^3 per minute or more; and

b.7.b. Capable of characterizing Class 10 clean air or better.

C. MATERIALS

3C001 Hetero-epitaxial materials consisting of a "substrate" having stacked epitaxially grown multiple layers of any of the following (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: III/V compounds are polycrystalline or binary or complex monocrystalline products consisting of elements of groups IIIA and VA of Mendeleyev's periodic classification table (e.g., gallium arsenide, gallium-aluminium arsenide, indium phosphide).

Items: a. Silicon;

b. Germanium; *or*

c. III/V compounds of gallium or indium.

3C002 Resist material and "substrates" coated with controlled resists.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: Silylation techniques are defined as processes incorporating oxidation of the resist surface to enhance performance for both wet and dry developing.
Items: a. Positive resists designed for semiconductor lithography specially adjusted (optimized) for use at wavelengths below 370 nm;

b. All resists designed for use with electron beams or ion beams, with a sensitivity of 0.01 μcoulomb/mm² or better;

c. All resists designed for use with X-rays, with a sensitivity of 2.5 mJ/mm² or better;

d. All resists optimized for surface imaging technologies, including silylated resists.

3C003 Organo-inorganic compounds, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry controls only compounds whose metallic, partly metallic or non-metallic element is directly linked to carbon in the organic part of the molecule.
Related Definition: N/A
Items: a. Organo-metallic compounds of aluminium, gallium or indium having a purity (metal basis) better than 99.999%;

b. Organo-arsenic, organo-antimony and organo-phosphorus compounds having a purity (inorganic element basis) better than 99.999%.

3C004 Hydrides of phosphorus, arsenic or antimony, having a purity better than 99.999%, even diluted in inert gases or hydrogen.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control hydrides containing less than 20% molar or more of inert gases or hydrogen.
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

3D001 "Software" specially designed for the "development" or "production" of equipment controlled by 3A001.b to 3A002.g or 3B (except 3B991 and 3B992).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 3A001.b to 3A001.f, 3A002, and 3B.	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 3D101
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D002 "Software" specially designed for the "use" of "stored program controlled" equipment controlled by 3B (except 3B991 and 3B992).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D003 Computer-aided-design (CAD) "software" designed for semiconductor devices or integrated circuits, having any of the following (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control ''software'' specially designed for schematic entry, logic simulation, placing and routing, layout verification or pattern generation tape.
Related Definitions: (1) Libraries, design attributes or associated data for the design of semiconductor devices or integrated circuits are considered as ''technology''. (2) A lithographic processing simulator is a ''software'' package used in the design phase to define the sequence of lithographic, etching and deposition steps for translating masking patterns into specific topographical patterns in conductors, dielectrics or semiconductor material.
Items: a. Design rules or circuit verification rules;

b. Simulation of the physically laid out circuits; *or*

c. Lithographic processing simulators for design.

3D101 "Software" specially designed for the "use" of equipment controlled by 3A101.b.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D102 "Software" specially designed for the "development" or "production" of equipment controlled by 3A001.a.1.a or 3A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D980 "Software" specially designed for the "development", "production", or "use" of items controlled by 3A980 and 3A981.

LICENSE REQUIREMENTS

Reason for Control: CC, AT

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D991 "Software" specially designed for the "development", "production", or "use" of electronic devices or components controlled by 3A991, general purpose electronic equipment controlled by 3A992, or manufacturing and test equipment controlled by 3B991 and 3B992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

3E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials controlled by 3A (except 3A292, 3A980, 3A981, 3A991 or 3A992), 3B (except 3B991 and 3B992) or 3C.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 3A001, 3A002, 3B001 and 3B002 or 3C001 to 3C004.	NS Column 1
MT applies to ''technology'' for equipment controlled by 3A001 or 3A101 for MT reasons.	MT Column 1
NP applies to ''technology'' for equipment controlled by 3A201, 3A225 to 3A233 for NP reasons.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: (1) See also 3E101 and 3E201. (2) 3E001 does not control ''technology'' for the ''development'' or ''production'' of: (a) Microwave transistors operating at frequencies below 31 GHz; (b) Integrated circuits controlled by 3A001.a.3 to a.12, having all of the following: 1. Using ''technology'' of one micrometer or more, AND 2. Not incorporating multi-layer structures. (3) The term multi-layer structures in this entry does not include devices incorporating a maximum of two metal layers and two polysilicon layers.
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E002 Other "technology" for the "development" or "production" of items described in the List of Items Controlled.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Vacuum microelectronic devices;

b. Hetero-structure semiconductor devices such as high electron mobility transistors (HEMT), hetero-bipolar transistors (HBT), quantum well and super lattice devices;

c. ''Superconductive'' electronic devices;

d. Substrates of films of diamond for electronic components.

3E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" controlled by 3A001.a.1.a. or 3A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E102 "Technology" according to the General Technology Note for the "development" of "software" controlled by 3D101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E201 "Technology" according to the General Technology Note for the "use" of equipment controlled by 3A201, 3A225 to 3A233.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E292 "Technology" according to the General Technology Note for the "development", "production", or "use" of equipment controlled by 3A292.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E980 "Technology" specially designed for "development", "production", or "use" of items controlled by 3A980 and 3A981.

LICENSE REQUIREMENTS

Reason for Control: CC, AT

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E991 "Technology" for the "development", "production", or "use" of electronic devices or components controlled by 3A991, general purpose electronic equipment controlled by 3A992, or manufacturing and test equipment controlled by 3B991 or 3B992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 4—Computers

NOTE 1: Computers, related equipment and ''software'' performing telecommunications or ''local area network'' functions must also be evaluated against the performance characteristics of Category 5, Part 1 (Telecommunications).

N.B. 1: Control units that directly interconnect the buses or channels of central processing units, ''main storage'' or disk controllers are not regarded as telecommunications equipment described in Category 5, Part 1 (Telecommunications).

N.B. 2: For the control status of ''software'' specially designed for packet switching, see ECCN 5D001 (Telecommunications).

NOTE 2: Computers, related equipment and ''software'' performing cryptographic, cryptoanalytic, certifiable multi-level security or certifiable user isolation functions, or that limit electromagnetic compatibility (EMC), must also be evaluated against the performance characteristics in Category 5, Part 2 (''Information Security'').

A. SYSTEMS, EQUIPMENT AND COMPONENTS

4A001 Electronic computers and related equipment, and "electronic assemblies" and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, NP, XP

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to items in 4A001.a when the parameters in 4A101 are met or exceeded.	MT Column 1
AT applies to entire entry	AT Column 1

NP applies to electronic computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of

the EAR for information on applicable licensing review policies.

XP applies to electronic computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. XP controls vary according to destination and end-user and end-use. See §742.12 of the EAR for additional information.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000 for 4A001.a; N/A for MT and 4A001.b
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 4A101 and 4A994. Equipment designed or rated for transient ionizing radiation is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) See also 4A101.
Related Definitions: For the purposes of integrated circuits in 4A001.a.2, 5×103 Gy(Si) = 5×105 Rads (Si); 5×106 Gy (Si)/s = 5×108 Rads (Si)/s.
Items: a. Specially designed to have either of the following characteristics:

a.1. Rated for operation at an ambient temperature below 228 K (−45 °C) or above 358 K (85 °C);

NOTE: 4A001.a.1. does not apply to computers specially designed for civil automobile or railway train applications.

a.2. Radiation hardened to exceed any of the following specifications:

a.2.a. A total dose of 5×10^3 Gy (Si); *or*

a.2.b. A dose rate upset of 5×10^6 Gy (Si)/s;

a.2.c. Single Event Upset of 1×10^{-7} Error/bit/day;

b. Having characteristics or performing functions exceeding the limits in Category 5, Part 2 (''Information Security'').

4A002 "Hybrid computers" and "electronic assemblies" and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, NP, XP

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to hybrid computers combined with specially designed ''software'', for modeling, simulation, or design integration of complete rocket systems and unmanned air vehicle systems that are usable in systems controlled for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

NP applies to hybrid computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to hybrid computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. XP controls vary according to destination and end-user and end-use. See §742.12 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: $5000; N/A for MT
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 4A102 and 4A994
Related Definitions: N/A
Items: a. Containing ''digital computers'' controlled by 4A003;

b. Containing analog-to-digital converters having all of the following characteristics:

b.1. 32 channels or more; *and*

b.2. A resolution of 14 bits (plus sign bit) or more with a conversion rate of 200,000 conversions/s or more.

4A003 "Digital computers", "electronic assemblies", and related equipment therefor, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, CC, AT, NP, XP

Control(s)	*Country Chart*
NS applies to 4A003.b and .c	NS Column 1
NS applies to 4A003.a, d, .e, .f, and .g.	NS Column 2
MT applies to digital computers used as ancillary equipment for test facilities and equipment that are controlled by 9B005 or 9B006.	MT Column 1
CC applies to digital computers for computerized finger-print equipment.	CC Column 1
AT applies to entire entry (refer to 4A994 for controls on digital computers with a CTP ≥6 but ≤ to 2,000 Mtops).	AT Column 1

NP applies to digital computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to digital computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. XP controls vary according to destination and end-user and end-use. See §742.12 of the EAR for additional information.

NOTE: For all destinations, except Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria, no license is required (NLR) for computers with a CTP of 2,000 Mtops, and for assemblies described in 4A003.c that are not capable of exceeding a CTP of 2,000 Mtops in aggregation. Computers controlled in this entry for MT reasons are not eligible for NLR.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000; N/A for MT and ''digital'' computers controlled by 4A003.b and having a CTP exceeding 10,000 MTOPS; or ''electronic assemblies'' controlled by 4A003.c and capable of enhancing performance by aggregation of ''computing elements'' so that the CTP of the aggregation exceeds 10,000 MTOPS.

GBS: Yes, for 4A003.d, .e, .f, and .g and specially designed components therefor, exported separately or as part of a system.

CTP: Yes, for computers controlled by 4A003.a, .b and .c, to the exclusion of other technical parameters, with the exception of parameters specified as controlled for Missile Technology (MT) concerns and 4A003.e (equipment performing analog-to-digital or digital-to-analog conversions exceeding the limits of 3A001.a.5.a). See §740.7 of the EAR.

CIV: Yes, for 4A003.d (having a 3–D vector rate less that 10 M vectors/sec), .e, .f and .g.

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: See also 4A994

Related Definitions: N/A

Items:

NOTE 1: 4A003 includes the following:

a. Vector processors;

b. Array processors;

c. Digital signal processors;

d. Logic processors;

e. Equipment designed for ''image enhancement'';

f. Equipment designed for ''signal processing''.

NOTE 2: The control status of the ''digital computers'' and related equipment described in 4A003 is determined by the control status of other equipment or systems provided:

a. The ''digital computers'' or related equipment are essential for the operation of the other equipment or systems;

b. The ''digital computers'' or related equipment are not a ''principal element'' of the other equipment or systems; *and*

N.B. 1: The control status of ''signal processing'' or ''image enhancement'' equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the ''principal element'' criterion.

N.B. 2: For the control status of ''digital computers'' or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. The ''technology'' for the ''digital computers'' and related equipment is determined by 4E.

a. Designed or modified for ''fault tolerance'';

NOTE: For the purposes of 4A003.a., ''digital computers'' and related equipment are not considered to be designed or modified for ''fault tolerance'' if they utilize any of the following:

1. Error detection or correction algorithms in ''main storage'';

2. The interconnection of two ''digital computers'' so that, if the active central processing unit fails, an idling but mirroring central processing unit can continue the system's functioning;

3. The interconnection of two central processing units by data channels or by use of shared storage to permit one central processing unit to perform other work until the second central processing unit fails, at which time the first central processing unit takes over in order to continue the system's functioning; or

4. The synchronization of two central processing units by ''software'' so that one central processing unit recognizes when the other central processing unit fails and recovers tasks from the failing unit.

b. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') exceeding 2,000 million theoretical operations per second (Mtops);

c. ''Electronic assemblies'' specially designed or modified to be capable of enhancing performance by aggregation of ''computing elements'' (''CEs'') so that the ''CTP'' of the aggregation exceeds the limit in 4A003.b.;

NOTE 1: 4A003.c applies only to ''electronic assemblies'' and programmable interconnections not exceeding the limit in 4A003.b. when shipped as unintegrated ''electronic assemblies''. It does not apply to ''electronic assemblies'' inherently limited by nature of their design for use as related equipment controlled by 4A003.d, 4A003.e or 4A003.f.

NOTE 2: 4A003.c does not control ''electronic assemblies'' specially designed for a product or family of products whose maximum configuration does not exceed the limit of 4A003.b.

d. Graphics accelerators and graphics coprocessors exceeding a ''three dimensional Vector Rate'' of 3,000,000;

e. Equipment performing analog-to-digital conversions exceeding the limits in 3A001.a.5;

f. Equipment containing ''terminal interface equipment'' exceeding the limits in 5A001.b.3;

NOTE: For the purposes of 4A003.f, ''terminal interface equipment'' includes ''local area network'' interfaces and other communications interfaces. ''Local area network'' interfaces are evaluated as ''network access controllers''.

g. Equipment specially designed to provide external interconnection of ''digital computers'' or associated equipment that allows communications at data rates exceeding 80 Mbyte/s.

NOTE: 4A003.g does not control internal interconnection equipment (e.g., backplanes, buses) or passive interconnection equipment.

4A004 Computers, as follows (see List of Items Controlled) and specially designed related equipment, "electronic assemblies" and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Systolic array computers'';
b. ''Neural computers'';
c. ''Optical computers''.

4A101 Analog computers, "digital computers" or digital differential analyzers, other than those controlled by 4A001 designed or modified for use in "missiles", having any of the following (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Rated for continuous operation at temperatures from below 228 K (−45° C) to above 328 K (+55° C); or

b. Designed as ruggedized or ''radiation hardened''.

4A102 "Hybrid computers" specially designed for modelling, simulation or design integration of "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

4A980 Computers for fingerprint equipment, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC, AT

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4A994 Computers, "electronic assemblies", and related equipment not controlled by 4A001, 4A002, or 4A003, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Electronic computers and related equipment, and ''electronic assemblies'' and specially designed components therefor, rated for operation at an ambient temperature above 343 K (70° C);

b. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') equal to or greater than 6 million theoretical operations per second (Mtops);

c. ''Assemblies'' not controlled by 4A003 that are specially designed or modified to enhance performance by aggregation of ''computing elements'' (''Ces''), as follows:

c.1. Designed to be capable of aggregation in configurations of 16 or more ''computing elements'' (''Ces''); or

c.2. Having a sum of maximum data rates on all channels available for connection to associated processors exceeding 40 million Bytes/s;

NOTE 1: 4A994.c applies only to ''electronic assemblies'' and programmable interconnections with a ''CTP'' not exceeding the limits in 4A994.b, when shipped as unintegrated ''electronic assemblies''. It does not apply to ''electronic assemblies'' inherently limited by nature of their design for use as related equipment controlled by 4A994.

NOTE 2: 4A994.c does not control any ''electronic assembly'' specially designed for a product or family of products whose maximum configuration does not exceed the limits of 4A994.b.

d. Disk drives and solid state storage equipment:

d.1. Magnetic, erasable optical or magneto-optical disk drives with a ''maximum bit transfer rate'' exceeding 25 million bit/s;

d.2. Solid state storage equipment, other than ''main storage'' (also known as solid state disks or RAM disks), with a ''maximum bit transfer rate'' exceeding 36 million bit/s;

e. Input/output control units designed for use with equipment controlled by 4A994.d;

f. Equipment for ''signal processing'' or ''image enhancement'', not controlled by 4A003, having a ''composite theoretical performance'' (''CTP'') exceeding 8.5 million theoretical operations per second (Mtops);

g. Graphics accelerators or graphics co-processors, not controlled by 4A003, that exceeds a ''3–D vector rate'' of 400,000 or, if supported by 2–D vectors only, a ''2–D vector rate'' of 600,000;

NOTE: The provisions of 4A994.g do not apply to work stations designed for and limited to:

a. Graphic arts (e.g., printing, publishing); *and*

b. The display of two-dimensional vectors.

h. Color displays or monitors having more than 120 resolvable elements per cm in the direction of the maximum pixel density;

NOTE 1: 4A994.h does not control displays or monitors not specially designed for electronic computers.

NOTE 2: Displays specially designed for air traffic control (ATC) systems are treated as specially designed components for ATC systems under Category 6.

i. Equipment containing ''terminal interface equipment'' exceeding the limits in 5A991.

NOTE: For the purposes of 4A994.i, ''terminal interface equipment'' includes ''local area network'' interfaces, modems and other communications interfaces. ''Local area network'' interfaces are evaluated as ''network access controllers''.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

4B994 Equipment for the "development" and "production" of magnetic and optical storage equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control general-purpose sputtering equipment.
Related Definition: N/A
Items: a. Equipment specially designed for the application of magnetic coating to controlled non-flexible (rigid) magnetic or magneto-optical media;

b. ''Stored program controlled'' equipment specially designed for monitoring, grading, exercising or testing controlled rigid magnetic media;

c. Equipment specially designed for the ''production'' or alignment of heads or head/disk assemblies for controlled rigid magnetic and magneto-optical storage, and electromechanical or optical components therefor.

C. MATERIALS

4C994 Materials specially formulated for and required for the fabrication of head/disk assemblies for controlled magnetic and magneto-optical hard disk drives.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

NOTE: The control status of ''software'' for the ''development'', ''production'', or ''use'' of equipment described in other Categories is dealt with in the appropriate Category. The

control status of ''software'' for equipment described in this Category is dealt with herein.

4D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment or "software" controlled by 4A001 to 4A004, or 4D (except 4D993 or 4D994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, CC, AT, NP, XP

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 4A001 to 4A004, 4D001 to 4D003.	NS Column 1
MT applies to ''software'' for equipment controlled by 4A001 to 4A003 for MT reasons.	MT Column 1
CC applies to ''software'' for equipment controlled by 4A003 for CC reasons.	CC Column 1
AT applies to entire entry	AT Column 1

NP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except N/A for MT and for ''software'' for equipment or ''software'' requiring a license and *except* for ''software'' specially designed for the ''development'', or ''production'' of equipment controlled as follows, for exports and reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom: (a) ''Digital'' computers controlled by 4A003.b and having a CTP exceeding 10,000 MTOPS; or (b) ''Electronic assemblies'' controlled by 4A003.c and capable of enhancing performance by aggregation of ''computing elements'' so that the CTP of the aggregation exceeds 10,000 MTOPS.

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4D002 "Software" specially designed or modified to support "technology" controlled by 4E (except 4E980, 4E992, and 4E993).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, NP, XP

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for equipment controlled by 4E for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

NP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except N/A for MT and for ''software'' specifically designed or modified to support ''technology'' for computers requiring a license.

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4D003 Specific "software", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exception.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except 4D003.c

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Operating system ''software'', ''software'' development tools and compilers specially designed for ''multi-data-stream processing'' equipment, in ''source code'';

b. ''Expert systems'' or ''software'' for ''expert system'' inference engines providing both:

b.1. Time dependent rules; and

b.2. Primitives to handle the time characteristics of the rules and the facts;

c. ''Software'' having characteristics or performing functions exceeding the limits in Category 5, Part 2 (''Information Security'');

d. Operating systems specially designed for ''real time processing'' equipment that guarantees a ''global interrupt latency time'' of less than 20 μs.

4D102 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 4A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4D980 "Software" specially designed for the "development", "production", or "use" of items controlled by 4A980.

LICENSE REQUIREMENTS

Reason for Control: CC, AT

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4D993 "Program" proof and validation "software", "software" allowing the automatic generation of "source codes", and operating system "software" not controlled by 4D003 that are specially designed for real time processing equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Program'' proof and validation ''software'' using mathematical and analytical techniques and designed or modified for ''programs'' having more than 500,000 ''source code'' instructions;

b. ''Software'' allowing the automatic generation of ''source codes'' from data acquired on line from external sensors described in the Commerce Control List;

c. Operating system ''software'' not controlled by 4D003 that are specially designed for ''real time processing'' equipment that guarantees a ''global interrupt latency time'' of less than 30 microseconds.

4D994 "Software" specially designed or modified for the "development", "production", or "use" of equipment controlled by 4A994, 4B994 and materials controlled by 4C994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

4E001 "Technology" according to the General Technology Note, for the "development", "production" or "use" of equipment or "software" controlled by 4A or 4D (except 4A980, 4A993 or 4A994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, CC, AT, NP, XP

Control(s)	*Country Chart*
NS applies to ''technology'' for equipment controlled by 4A001 to 4A004, 4D001 to 4D003.	NS Column 1
MT applies to ''technology'' for items controlled by 4A001 to 4A003, 4A101, 4D001, 4D102 or 4D002 for MT reasons.	MT Column 1
CC applies to ''technology'' for equipment controlled by 4A003 for CC reasons.	CC Column 1
AT applies to entire entry	AT Column 1

NP applies to ''technology'' for computers with a CTP greater than 2,000 Mtops, unless

a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''technology'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes for ''technology'' directly related for hardware under a License Exception. N/A for MT and for ''technology'' for the ''development'' or ''production'' of equipment or ''software'' for export and reexport to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' for: (a) ''Digital'' computers controlled by 4A003.b and having a CTP exceeding 10,000 MTOPS; or (b) ''Electronic assemblies'' controlled by 4A003.c and capable of enhancing performance by aggregation of ''computing elements'' so that the CTP of the aggregation exceeds 10,000 MTOPS.

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4E980 "Technology" for the "development", "production", or "use" of items controlled by 4A980.

LICENSE REQUIREMENTS

Reason for Control: CC, AT

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4E992 "Technology" for the "development", "production", or "use" of equipment controlled by 4A994 and 4B994, materials controlled by 4C994, or "software" controlled by 4D993 or 4D994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 4E994
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4E993 Other "Technology" for the "development" or "production" of graphics accelerators or equipment designed for "multi-data-stream processing" and "technology" "required" for the "development" or "production" of magnetic hard disk drives.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Technology'' for the ''development'' or ''production'' of graphics accelerators;

b. ''Technology'', for the ''development'' or ''production'' of equipment designed for ''multi-data-stream processing'';

c. ''Technology'', ''required'' for the ''development'' or ''production'' of magnetic hard disk drives with a ''maximum bit transfer rate'' (''MBTR'') exceeding 11 Mbit/s.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

TECHNICAL NOTE: ''COMPOSITE THEORETICAL PERFORMANCE'' (''CTP'').

Abbreviations used in this Technical Note

''CE'' ''computing element'' (typically an arithmetic logical unit)
FP floating point
XP fixed point
t execution time
XOR exclusive OR
CPU central processing unit
TP theoretical performance (of a single ''CE'')
''CTP'' ''composite theoretical performance'' (multiple ''CEs'')
R effective calculating rate

WL word length
L word length adjustment
* multiply

Execution time t is expressed in microseconds, TP and ''CTP'' are expressed in millions of theoretical operations per second (Mtops) and WL is expressed in bits.

Outline of ''CTP'' Calculation Method

''CTP'' is a measure of computational performance given in Mtops. In calculating the ''CTP'' of an aggregation of ''CEs'' the following three steps are required:

1. Calculate the effective calculating rate R for each ''CE'';
2. Apply the word length adjustment (L) to the effective calculating rate (R), resulting in a Theoretical Performance (TP) for each ''CE'';
3. If there is more than one ''CE'', combine the TPs, resulting in a ''CTP'' for the aggregation.

Details for these steps are given in the following sections.

NOTE 1: For aggregations of multiple ''CEs'' that have both shared and unshared memory subsystems, the calculation of ''CTP'' is completed hierarchically, in two steps: first, aggregate the groups of ''CEs'' sharing memory; second, calculate the ''CTP'' of the groups using the calculation method for multiple ''CEs'' not sharing memory.

NOTE 2: ''CEs'' that are limited to input/output and peripheral functions (e.g., disk drive, communication and video display controllers) are not aggregated into the ''CTP'' calculation.

The following table shows the method of calculating the Effective Calculating Rate R for each ''CE'':

Step 1: *The effective calculating rate R*

	Effective calculating Rate, R
XP only ..... (R_{xp})	$1 \div 3 * (t_{xp\ add})$, if no add is implemented use: $1 \div (t_{xp\ mult})$ If neither add nor multiply is implemented use the fastest available arithmetic operation as follows: $1 \div 3 * t_{xp}$. See Notes X & Z.
FP only (R_{fp})	max $1 \div t_{fp\ add}$, $1 \div t_{fp\ mult}$, See Notes X & Y.
Both FP and XP (R)	Calculate both R_{xp}, R_{fp}.
For simple logic processors not implementing any of the specified arithmetic operations.	$1 \div 3 * t_{log}$. Where t_{log} is the execute time of the XOR, or for logic hardware not implementing the XOR, the fastest simple logic operation. See Notes X & Z.
For special logic processors not using any of the specified arithmetic or logic operations.	$R = R' * WL/64$. Where R' is the number of results per second, WL is the number of *bits* upon which the logic operation occurs, and 64 is a factor to normalize to a 64 bit operation.

NOTE W: For a pipelined ''CE'' capable of executing up to one arithmetic or logic operation every clock cycle after the pipeline is full, a pipelined rate can be established. The effective calculating rate (R) for such a ''CE'' is the faster of the pipelined rate or non-pipelined execution rate.

NOTE X: For a ''CE'' that performs multiple operations of a specific type in a single cycle (e.g., two additions per cycle or two identical logic operations per cycle), the execution time t is given by:

$$t = \frac{\text{cycle time}}{\text{the number of identical operations per machine cycle}}$$

''CEs'' that perform different types of arithmetic or logic operations in a single machine cycle are to be treated as multiple separate ''CEs'' performing simultaneously (e.g., a ''CE'' performing an addition and a multiplication in one cycle is to be treated as two ''CEs'', the first performing an addition in one cycle and the second performing a multiplication in one cycle). If a single ''CE'' has both scalar function and vector function, use the shorter execution time value.

NOTE Y: For the ''CE'' that does not implement FP add or FP multiply, but that performs FP divide:

$$R_{fp} = \frac{1}{t_{fpdivide}}$$

If the ''CE'' implements FP reciprocal but not FP add, FP multiply or FP divide, then

$$R_{fp} = \frac{1}{t_{fpreciprocal}}$$

If none of the specified instructions is implemented, the effective FP rate is 0.

NOTE Z: In simple logic operations, a single instruction performs a single logic manipulation of no more than two operands of given lengths. In complex logic operations, a single instruction performs multiple logic manipulations to produce one or more results from two or more operands.

Rates should be calculated for all supported operand lengths considering both

pipelined operations (if supported), and non-pipelined operations using the fastest executing instruction for each operand length based on:

1. Pipelined or register-to-register operations. Exclude extraordinarily short execution times generated for operations on a predetermined operand or operands (for example, multiplication by 0 or 1). If no register-to-register operations are implemented, continue with (2).

2. The faster of register-to-memory or memory-to-register operations; if these also do not exist, then continue with (3).

3. Memory-to-memory.

In each case above, use the shortest execution time certified by the manufacturer.

Step 2: *TP for each supported operand length WL.*

Adjust the effective rate R (or R') by the word length adjustment L as follows:

TP = R * L, where L = (1/3 + WL/96)

NOTE: The word length WL used in these calculations is the operand length in bits. (If an operation uses operands of different lengths, select the largest word length.) The combination of a mantissa ALU and an exponent ALU of a floating point processor or unit is considered to be one ''CE'' with a Word Length (WL) equal to the number of bits in the data representation (typically 32 or 64) for purposes of the ''CTP'' calculation.

This adjustment is not applied to specialized logic processors that do not use XOR instructions. In this case TP = R.

Select the maximum resulting value of TP for:

Each XP-only ''CE'' (R_{xp});
Each FP-only ''CE'' (R_{fp});
Each combined FP and XP ''CE'' (R);
Each simple logic processor not implementing any of the specified arithmetic operations; and
Each special logic processor not using any of the specified arithmetic or logic operations.

Step 3: *''CTP'' for aggregations of ''CEs'', including CPUs.*

For a CPU with a single ''CE'', ''CTP'' = TP (for ''CEs'' performing both fixed and floating point operations TP = max (TP_{fp}, TP_{xp}))

''CTP'' for aggregations of multiple ''CEs'' operating simultaneously is calculated as follows:

NOTE 1: For aggregations that do not allow all of the ''CEs'' to run simultaneously, the possible combination of ''CEs'' that provides the largest ''CTP'' should be used. The TP of each contributing ''CE'' is to be calculated at its maximum value theoretically possible before the ''CTP'' of the combination is derived.

N.B.: To determine the possible combinations of simultaneously operating ''CEs'', generate an instruction sequence that initiates operations in multiple ''CEs'', beginning with the slowest ''CE'' (the one needing the largest number of cycles to complete its operation) and ending with the fastest ''CE''. At each cycle of the sequence, the combination of ''CEs'' that are in operation during that cycle is a possible combination. The instruction sequence must take into account all hardware and/or architectural constraints on overlapping operations.

NOTE 2: A single integrated circuit chip or board assembly may contain multiple ''CEs''.

NOTE 3: Simultaneous operations are assumed to exist when the computer manufacturer claims concurrent, parallel or simultaneous operation or execution in a manual or brochure for the computer.

NOTE 4: ''CTP'' values are not to be aggregated for ''CE'' combinations (inter) connected by ''Local Area Networks'', Wide Area Networks, I/O shared connections/devices, I/O controllers and any communication interconnection implemented by ''software''.

NOTE 5: ''CTP'' values must be aggregated for multiple ''CEs'' specially designed to enhance performance by aggregation, operating simultaneously and sharing memory,—or multiple memory/''CE''—combinations operating simultaneously utilizing specially designed hardware.

This aggregation does not apply to ''electronic assemblies'' described by 4A003.d.

''CTP''=TP_1+C_2 * TP_2+* * *+C_n * TP_n,

where the TPs are ordered by value, with TP_1 being the highest, TP_2 being the second highest, * * *, and TP_n being the lowest. C_i is a coefficient determined by the strength of the interconnection between ''CEs'', as follows:

For multiple ''CEs'' operating simultaneously and sharing memory:

C_2=C_3=C_4=* * *=C_n=0.75

NOTE 1: When the ''CTP'' calculated by the above method does not exceed 194 Mtops, the following formula may be used to calculate C_i:

$$C_i = \frac{0.75}{\sqrt{m}} \qquad (i = 2, \ldots, n)$$

where m=the number of ''CEs'' or groups of ''CEs'' sharing access.

Provided:

1. The TP_1 of each ''CE'' or group of ''CEs'' does not exceed 30 Mtops;

2. The ''CEs'' or groups of ''CEs'' share access to main memory (excluding cache memory) over a single channel; and

3. Only one ''CE'' or group of ''CEs'' can have use of the channel at any given time.

N.B.: This does not apply to items controlled under Category 3.

NOTE 2: ''CEs'' share memory if they access a common segment of solid state memory.

This memory may include cache memory, main memory or other internal memory. Peripheral memory devices such as disk drives, tape drives or RAM disks are not included.

For Multiple ''CEs'' or groups of ''CEs'' not sharing memory, interconnected by one or more data channels:

$_i$=0.75 * k_i (i=2, * * * , 32) (see Note below)
=0.60 * k_i (i=33, * * *, 64)
=0.45 * k_i (i=65, * * *, 256)
=0.30 * k_i (i >256)

The value of C_i is based on the number of ''CE''s, not the number of nodes.

where
k_i=min (S_i/K_r, 1), and
K_r=normalizing factor of 20 MByte/s.
S_i=sum of the maximum data rates (in units of MByte/s) for all data channels connected to the i^{th} ''CE'' or group of ''CEs'' sharing memory.

When calculating a C_i for a group of ''CEs'', the number of the first ''CE'' in a group determines the proper limit for C_i. For example, in an aggregation of groups consisting of 3 ''CEs'' each, the 22nd group will contain ''CE''$_{64}$, ''CE''$_{65}$ and ''CE''$_{66}$. The proper limit for C_i for this group is 0.60.

Aggregation (of ''CEs'' or groups of ''CEs'') should be from the fastest-to-slowest; i.e.:

$TP_1 \geq TP_2 \geq$ * * * . $>TP_n$, and

in the case of $TP_i=TP_{i+1}$, from the largest to smallest; i.e.:

$C_i \geq C_{i+1}$

NOTE: The k_i factor is not to be applied to ''CEs'' 2 to 12 if the TP_i of the ''CE'' or group of ''CEs'' is more than 50 Mtops; i.e., C_i for ''CEs'' 2 to 12 is 0.75.

Category 5—Telecommunications and ''Information Security''

I. TELECOMMUNICATIONS

NOTES: 1. The control status of components, ''lasers'', test and ''production'' equipment, materials and ''software'' therefor which are specially designed for telecommunications equipment or systems is determined in Category 5, Part 1.

2. ''Digital computers'', related equipment or ''software'', when essential for the operation and support of telecommunications equipment described in this Category, are regarded as specially designed components, provided they are the standard models customarily supplied by the manufacturer. This includes operation, administration, maintenance, engineering or billing computer systems.

A. SYSTEMS, EQUIPMENT AND COMPONENTS

5A001 Telecommunications systems, equipment, and components.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to 5A001.a	NS Column 1
NS applies to 5A001.b, .c, .d, or .e.	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: N/A for 5A001.a and b.9;
$5000 for 5A001.b.1 to b.8 and b.10, .c, and .e
$3000 for 5A001.d
GBS: Yes, except 5A001.a and b.9
CIV: Yes, except 5A001.a, b.8, and b.9

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 5A101 and 5A991
Related Definitions: N/A
Items: a. Any type of telecommunications equipment having any of the following characteristics, functions or features:

a.1. Specially designed to withstand transitory electronic effects or electromagnetic pulse effects, both arising from a nuclear explosion;

a.2. Specially hardened to withstand gamma, neutron or ion radiation; *or*

a.3. Specially designed to operate outside the temperature range from 218 K (−55°C) to 397 K (124°C).

NOTE: 5A001.a.3 applies only to electronic equipment.

NOTE: 5A001.a.2 and 5A001.a.3 do not apply to equipment on board satellites.

b. Telecommunication transmission equipment and systems, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:

NOTE: Telecommunication transmission equipment:

a. Categorized as follows, or combinations thereof:

1. Radio equipment (e.g., transmitters, receivers and transceivers);
2. Line terminating equipment;
3. Intermediate amplifier equipment;
4. Repeater equipment;
5. Regenerator equipment;
6. Translation encoders (transcoders);
7. Multiplex equipment (statistical mutiplex included);
8. Modulators/demodulators (modems);
9. Transmultiplex equipment (see CCITT Rec. G701);
10. ''Stored program controlled'' digital crossconnection equipment;
11. ''Gateways'' and bridges;
12. ''Media access units''; and

b. Designed for use in single or multi-channel communication via any of the following:

1. Wire (line);
2. Coaxial cable;
3. Optical fiber cable;
4. Electromagnetic radiation; or
5. Underwater acoustic wave propagation.

b.1. Employing digital techniques, including digital processing of analog signals, and designed to operate at a ''digital transfer rate'' at the highest multiplex level exceeding 45 Mbit/s or a ''total digital transfer rate'' exceeding 90 Mbit/s;

NOTE: 5A001.b.1 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

b.2. Being underwater communications systems having any of the following characteristics:

b.2.a. An acoustic carrier frequency outside the range from 20 kHz to 60 kHz;

b.2.b. Using an electromagnetic carrier frequency below 30 kHz; or

b.2.c. Using electronic beam steering techniques;

b.3. Being equipment containing any of the following:

b.3.a. ''Network access controllers'' and their related common medium having a ''digital transfer rate'' exceeding 156 Mbit/s; or

b.3.b. ''Communication channel controllers'' with a digital output having a ''data signalling rate'' exceeding 2.1 Mbit/s per channel;

NOTE: If any uncontrolled equipment contains a ''network access controller'', it cannot have any type of telecommunications interface, except those described in, but not controlled by 5A001.b.3.

b.4. Employing a ''laser'' and having any of the following characteristics:

b.4.a. A transmission wavelength exceeding 1,000 nm; or

b.4.b. Employing analog techniques and having a bandwidth exceeding 45 MHz;

NOTE: 5A001.b.4.b does not control commercial TV systems.

b.4.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);

b.4.d. Employing wavelength division multiplexing techniques; or

b.4.e. Performing ''optical amplification'';

b.5. Being radio equipment operating at input or output frequencies exceeding 31 GHz;

NOTE: 5A001.b.5 does not control equipment designed or modified for operation in any ITU allocated band.

b.6. Being radio equipment employing any of the following:

b.6.a. Quadrature-amplitude-modulation (QAM) techniques above level 4 if the ''total digital transfer rate'' exceeds 8.5 Mbit/s;

b. QAM techniques above level 16 if the ''total digital transfer rate'' is equal to or less than 8.5 Mbit/s; or

c. Other digital modulation techniques and having a ''spectral efficiency'' exceeding 3 bit/sec/Hz;

NOTES: 1. 5A001.b.6 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

2. 5A001.b.6 does not control radio relay equipment for operation in an ITU allocated band:

a. Having any of the following:

a.1. Not exceeding 960 MHz; or

a.2. With a ''total digital transfer rate'' not exceeding 8.5 Mbit/s; and

b. Having a ''spectral efficiency'' not exceeding 4 bit/sec/Hz.

b.7. Being radio equipment operating in the 1.5 MHz to 87.5 MHz band and having any of the following characteristics:

b.7.a. Incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal; or

b.7.b. Having all of the following:

b.7.b.1. Automatically predicting and selecting frequencies and ''total digital transfer rates'' per channel to optimize the transmission; and

b.7.b.2. Incorporating a linear power amplifier configuration having a capability to support multiple signals simultaneously at an output power of 1 kW or more in the 1.5 MHz to 30 MHz frequency range or 250 W or more in the 30 MHz to 87.5 MHz frequency range, over an ''instantaneous bandwidth'' of one octave or more and with an output harmonic and distortion content of better than -80 dB;

b.8. Being radio equipment employing ''spread spectrum'' or ''frequency agility'' (frequency hopping) techniques having any of the following characteristics:

b.8.a. User programmable spreading codes; or

b.8.b. A total transmitted bandwidth which is 100 or more times the bandwidth of any one information channel and in excess of 50 kHz;

NOTE: 5A001.b.8.b does not control cellular radio equipment operating in civil bands.

NOTE: 5A001.b.8 does not control equipment operating at an output power of 1.0 Watt or less.

b.9. Being digitally controlled radio receivers having all of the following:

b.9.a. More than 1,000 channels;

b.9.b. A ''frequency switching time'' of less than 1 ms;

b.9.c. Automatic searching or scanning of a part of the electromagnetic spectrum; and

b.9.d. Identification of the received signals or the type of transmitter; or

NOTE: 5A001.b.9 does not control cellular radio equipment operating in civil bands.

b.10. Employing functions of digital ''signal processing'' to provide voice coding at rates of less than 2,400 bit/s.

c. ''Stored program controlled'' switching equipment and related signalling systems, having any of the following characteristics, functions or features, and specially designed components and accessories therefor:

NOTE: Statistical multiplexers with digital input and digital output which provide switching are treated as ''stored program controlled'' switches.

c.1. ''Common channel signalling'' operating in either non-associated or quasi-associated mode of operation;

c.2. ''Dynamic adaptive routing'';

NOTE: 5A001.c.2 does not control packet switches or routers with ports or lines not exceeding the limits in 5A001.c.3.

c.3. Being packet switches, circuit switches and routers with ports or lines exceeding any of the following:

c.3.a. A ''data signalling rate'' of 2.1 Mbit/s per channel for a ''communications channel controller''; or

NOTE: 5A001.c.3.a does not control multiplexed composite links composed only of communication channels not individually controlled by 5A001.c.3.a.

c.3.b. A ''digital transfer rate'' of 156 Mbit/s for a ''network access controller'' and related common medium;

c.4. ''Optical switching'';

c.5. Employing ''Asynchronous Transfer Mode'' (''ATM'') techniques.

d. Optical fiber communication cables, optical fibers and accessories, as follows:

d.1. Optical fibers and optical fiber cables of more than 50 m in length having any of the following characteristics:

d.1.a. Designed for single mode operation; or

d.1.b. For optical fibers, specified by the manufacturer as being capable of withstanding a proof test tensile stress of 2×10^9 N/m^2 or more;

TECHNICAL NOTE: Proof Test: on-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fiber at a running rate of 2 to 5 m/s while passing between capstans approximately 150 mm in diameter. The ambient temperature is a nominal 293 K (20° C) and relative humidity 40%.

N.B.: Equivalent national standards may be used for executing the proof test.

d.2. Optical fiber cables and accessories designed for underwater use.

NOTE: 5A001.d.2 does not control standard civil telecommunication cables and accessories.

N.B.: For fiber-optic hull penetrators or connectors, see 8A002.c.

e. ''Electronically steerable phased array antennae'' operating above 31 GHz.

NOTE: 5A001.e does not control ''electronically steerable phased array antennae'' for landing systems with instruments meeting ICAO standards covering microwave landing systems (MLS).

5A101 Telemetering and telecontrol equipment usable for "missiles".

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A980 Communications intercepting devices; and parts and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: Controls on equipment described in this entry are maintained in accordance with the Omnibus Crime Control and Safe Streets Act of 1968 (Public Law 90–351). A license is required for ALL destinations, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See §742.13 of the EAR for additional information on the scope of this control.)

NOTE: These items are subject to the United Nations Security Council arms embargo against Rwanda described in §746.8 of the EAR.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A991 Telecommunication equipment, not controlled by 5A001.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Any type of telecommunications equipment, not controlled by 5A001.a, specially designed to operate outside the temperature range from 219 K (−54° C) to 397 K (124° C).

b. Transmission equipment, as follows:

b.1. Modems using the ''bandwidth of one voice channel'' with a ''data signalling rate'' exceeding 9,600 bits per second;

b.2. ''Communication channel controllers'' with a digital output having a ''data signalling rate'' exceeding 64,000 bit/s per channel; or

b.3. ''Network access controller'' and their related common medium having a ''digital transfer rate'' exceeding 33 Mbit/s.

b.4. Being ''stored program controlled'' digital cross connect equipment with ''digital transfer rate'' exceeding 8.5 Mbit/s per port.

b.5. Radio equipment operating at input or output frequencies exceeding:

b.5.1. 31 GHz for satellite-earth station applications; or

b.5.2. 26.5 GHz for other applications;

NOTE: 5A991.b.5. does not control equipment for civil use when conforming with an International Telecommunications Union (ITU) allocated band between 26.5 GHz and 31 GHz.

b.6. Providing functions of digital ''signal processing'' as follows:

b.6.a. Voice coding at rates less than 2,400 bit/s;

b.6.b. Employing circuitry that incorporates ''user-accessible programmability'' of digital ''signal processing'' circuits exceeding the limits of 4A003.b.

c. ''Stored program controlled'' switching equipment and related signalling systems as follows:

c.1. ''Data (message) switching'' equipment or systems designed for ''packet-mode operation'' and assemblies and components therefor, n.e.s.

c.2. Containing ''Integrated Services Digital Network'' (ISDN) functions and having any of the following:

c.2.a. Switch-terminal (e.g., subscriber line) interfaces with a ''digital transfer rate'' at the highest multiplex level exceeding 192,000 bit/s, including the associated signalling channel (e.g., 2B+D); or

c.2.b. The capability that a signalling message received by a switch on a given channel that is related to a communication on another channel may be passed through to another switch.

NOTE: 5A991.b. does not preclude the evaluation and appropriate actions taken by the receiving switch or unrelated user message traffic on a D channel of ISDN.

c.3. Routing or switching of ''datagram'' packets;

c.4. Routing or switching of ''fast select'' packets;

NOTE: The restrictions in 5A991.c.3 and c.4 do not apply to networks restricted to using only ''network access controllers'' or to ''network access controllers'' themselves.

c.5. Multi-level priority and pre-emption for circuit switching;

NOTE: 5A991.c.5. does not control single-level call preemption.

c.6. Designed for automatic hand-off of cellular radio calls to other cellular switches or automatic connection to a centralized subscriber data base common to more than one switch;

c.7. Containing ''stored program controlled'' digital crossconnect equipment with ''digital transfer rate'' exceeding 8.5 Mbit/s per port.

c.8. Being packet switches, circuit switches and routers with ports or lines exceeding any of the following:

c.8.a. A ''data signalling rate'' of 64,000 bit/s per channel for a ''communications channel controller''; or

NOTE: 5A991.c.8.a. does not control multiplex composite links composed only of communication channels not individually controlled by 5A001.b.1.

c.8.b. A ''digital transfer rate'' of 33 Mbit/s for a ''network cess controller'' and related common media;

d. Centralized network control having all of the following characteristics:

d.1. Receives data from the nodes; and

d.2. Process these data in order to provide control of traffic not requiring operator decisions, and thereby performing ''dynamic adaptive routing'';

NOTE: 5A991.d. does not preclude control of traffic as a function of predictable statistical traffic conditions.

e. Phased array antennae, operating above 10.5 GHz, containing active elements and distributed components, and designed to permit electronic control of beam shaping and pointing, except for landing systems with instruments meeting International Civil Aviation Organization (ICAO) standards (microwave landing systems (MLS)).

f. Mobile communications equipment, n.e.s., and assemblies and components therefor; *or*

g. Radio relay communications equipment designed for use at frequencies equal to or

exceeding 19.7 GHz and assemblies and components therefor, n.e.s.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

5B001 Equipment and specially designed components or accessories therefor, specially designed for the "development", "production" or "use" of equipment, materials, functions or features controlled by 5A001, 5B001, 5C001, 5D001 or 5E001.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 5B991. This entry does not control optical fibers and ''optical fiber preform'' characterization equipment not using semiconductor ''lasers''.
Related Definition: N/A
Items: The List of Items Controlled is contained in the ECCN heading.

5B991 Telecommunications test equipment, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1,000 for Syria; N/A to Iran
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS

5C001 Preforms of glass or of any other material optimized for the manufacture of optical fibers controlled by 5A001.d.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

5D001 "Software", as described in the List of Items Controlled.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: Yes, except for ''software'' controlled by 5D001.b or .c, when specially designed or modified for equipment, functions or features controlled by 5A001.b.9

TSR: Yes, except for exports and reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''software'' controlled by 5D001.a and specially designed for items controlled by 5A001.b.9

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 5D991
Related Definitions: N/A
Items: a. ''Software'' specially designed or modified for the ''development'', ''production'' or ''use'' of equipment, functions or features controlled by 5A001, 5B001 or 5C001.

b. ''Software'' specially designed or modified to support ''technology'' controlled by 5E001.

c. Specific ''software'' as follows:

c.1. ''Software'', other than in machine-executable form, specially designed or modified for the ''use'' of digital cellular radio equipment or systems;

c.2. ''Software'' specially designed or modified to provide characteristics, functions or features of equipment controlled by 5A001 or 5B001;

c.3. ''Software'' which provides the capability of recovering ''source code'' of telecommunications ''software'' controlled by 5A001, 5B001, or 5C001;

c.4. ''Software'', other than in machine-executable form, specially designed for ''dynamic adaptive routing''.

N.B.: For ''software'' for ''signal processing'' see also 4D and 6D.

5D101 "Software" designed or modified for the "development", "production" or "use of items controlled by 5A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5D991 "Software" specially designed or modified for the "development", "production", or "use" of equipment controlled by 5A991 and 5B991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

5E001 "Technology", (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' controlled by 5E001.a for the ''development'' or ''production'' of items controlled by 5A001.b.9 or 5D001.a.

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 5E101 and 5E991
Related Definitions: N/A
Items: a. ''Technology'' according to the General Technology Note for the ''development'', ''production'' or ''use'' (excluding operation) of equipment, functions or features, materials or ''software'' controlled by 5A001, 5B001, 5C001 or 5D001.

b. Specific ''technologies'', as follows:

b.1. ''Required'' ''technology'' for the ''development'' or ''production'' of telecommunications equipment specially designed to be used on board satellites;

b.2. ''Technology'' for the ''development'' or ''use'' of ''laser'' communication techniques with the capability of automatically acquiring and tracking signals and maintaining communications through exoatmosphere or sub-surface (water) media;

b.3. ''Technology'' for the processing and application of coatings to optical fiber specially designed to make it suitable for underwater use;

b.4. ''Technology'' for the ''development'' of equipment employing ''Synchronous Digital Hierarchy'' (''SDH'') or ''Synchronous Optical Network'' (''SONET'') techniques;

b.5. ''Technology'' for the ''development'' of ''switch fabric'' exceeding 64,000 bit/s per information channel other than for digital cross connect integrated in the switch;

b.6. ''Technology'' for the ''development'' of centralized network control or ''dynamic adaptive routing'';

b.7. ''Technology'' for the ''development'' of digital cellular radio systems;

b.8. ''Technology'' for the ''development'' of broadband ''Integrated Services Digital Network'' (''ISDN'');

b.9. ''Technology'' for the ''development'' of QAM techniques, for radio equipment, above level 4;

b.10. ''Technology'' for the ''development'' of ''spread spectrum'' or ''frequency agility'' (frequency hopping) techniques.

5E101 "Technology" according to the General Technology Note for the "development", "production" or "use" of equipment controlled by 5A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E111 "Technology" according to the General Technology Note for the "development", "production", or "use" of "software" controlled by 5D101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E991 "Technology" for the "development", "production" or "use" of equipment controlled by 5A991 or 5B991, or "software" controlled by 5D991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

PART 2—''INFORMATION SECURITY''

NOTE: The control status of ''information security'' equipment, ''software'', systems, application specific ''electronic assemblies'', modules, integrated circuits, components, or functions is determined in Category 5, Part 2 even if they are components or ''electronic assemblies'' of other equipment.

A. SYSTEMS, EQUIPMENT AND COMPONENTS

5A002 Systems, equipment, application specific "assemblies", modules or integrated circuits for "information security", and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, EI

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
AT applies to entire entry	AT Column 1.

EI applies to encryption items transferred from the U.S. Munitions List to the Commerce Control List consistent with E.O. 13026 of November 15, 1996 (61 FR 58767) and pursuant to the Presidential Memorandum of that date. Refer to §742.15 of this subchapter.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports of commodities controlled under 5A002 and exported under License Exceptions LVS or GOV.

LICENSE EXCEPTIONS

LVS: Yes: $500 for components and spare parts only. N/A for equipment.
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 5A992. This entry does not control: (a) ''Personalized smart cards'' or specially designed components therefor, with any of the following characteristics: (1) Not capable of message traffic encryption or encryption of user-supplied data or related key management functions therefor; or (2) When restricted for use in equipment or systems excluded from control under the note to 5A002.c, or under paragraphs (b) through (h) of this note. (b) Equipment containing ''fixed'' data compression or coding techniques; (c) Receiving equipment for radio broadcast, pay television or similar restricted audience television of the consumer type, without digital encryption and where digital decryption is limited to the video, audio or management functions; (d) Portable or mobile radiotelephones for civil use (e.g., for use with commercial civil cellular radiocommunications systems) that are not capable of end-to-end encryption; (e) Decryption functions specially designed to allow the execution of copy-protected ''software'', provided the decryption functions are not user-accessible; (f) Access

control equipment, such as automatic teller machines, self-service statement printers or point of sale terminals, that protects password or personal identification numbers (PIN) or similar data to prevent unauthorized access to facilities but does not allow for encryption of files or text, except as directly related to the password or PIN protection; (g). Data authentication equipment that calculates a Message Authentication Code (MAC) or similar result to ensure no alteration of text has taken place, or to authenticate users, but does not allow for encryption of data, text or other media other than that needed for the authentication; (h) Cryptographic equipment specially designed, developed or modified for use in machines for banking or money transactions, and restricted to use only in such transactions. Machines for banking or money transactions include automatic teller machines, self-service statement printers, point of sale terminals, or equipment for the encryption of interbanking transactions.

Related Definitions: For the control of global navigation satellite systems receiving equipment containing or employing decryption (i.e. GPS or GLONASS), see 7A005.

Items: a. Systems, equipment, application specific ''assemblies'', modules or integrated circuits for ''information security'', and specially designed components therefor:

a.1. Designed or modified to use ''cryptography'' employing digital techniques to ensure ''information security'';

a.2. Designed or modified to perform cryptoanalytic functions;

a.3. Designed or modified to use ''cryptography'' employing analog techniques to ensure ''information security'';

NOTE: 5A002.a.3 does not control the following:

1. Equipment using ''fixed'' band scrambling not exceeding 8 bands and in which the transpositions change not more frequently than once every second;

2. Equipment using ''fixed'' band scrambling exceeding 8 bands and in which the transpositions change not more frequently than once every ten seconds;

3. Equipment using ''fixed'' frequency inversion and in which the transpositions change not more frequently than once every second;

4. Facsimile equipment;

5. Restricted audience broadcast equipment; and 6. Civil television equipment;

a.4. Designed or modified to suppress the compromising emanations of information-bearing signals;

NOTE: 5A002.a.4 does not control equipment specially designed to suppress emanations for reasons of health and safety.

a.5. Designed or modified to use cryptographic techniques to generate the spreading code for ''spread spectrum'' or the hopping code for ''frequency agility'' systems;

a.6. Designed or modified to provide certified or certifiable ''multilevel security'' or user isolation at a level exceeding Class B2 of the Trusted Computer System Evaluation Criteria (TCSEC) or equivalent;

a.7. Communications cable systems designed or modified using mechanical, electrical or electronic means to detect surreptitious intrusion.

5A992 "Information security" equipment, n.e.s.; (e.g., cryptographic, cryptoanalytic, and cryptologic equipment, n.e.s.), and components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry.	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

5B002 Information Security—test, inspection and "production" equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry.	NS Column 1
AT applies to entire entry.	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A

Items: a. Equipment specially designed for:

a.1. The ''development'' of equipment or functions controlled by 5A002, 5B002, 5D002 or 5E002, including measuring or test equipment;

a.2. The ''production'' of equipment or functions controlled by 5A002, 5B002, 5D002, or 5E002, including measuring, test, repair or production equipment;

b. Measuring equipment specially designed to evaluate and validate the ''information security'' functions controlled by 5A002 or 5D002.

C. MATERIALS [RESERVED]

D. SOFTWARE

5D002 Information Security—"Software".

LICENSE REQUIREMENTS

Reason for Control: NS, AT, EI

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
AT applies to entire entry	AT Column 1.

EI applies to encryption items transferred from the U.S. Munitions List to the Commerce Control List consistent with E.O. 13026 of November 15, 1996 (61 FR 58767) and pursuant to the Presidential Memorandum of that date. Refer to §742.15 of the EAR.

NOTE: Encryption software is controlled because of its functional capacity, and not because of any informational value of such software; such software is not accorded the same treatment under the EAR as other ''software''; and for export licensing purposes, encryption software is treated under the EAR in the same manner as a commodity included in ECCN 5A002. License Exceptions for commodities are not applicable.

NOTE: Encryption software controlled for EI reasons under this entry remains subject to the EAR even when made publicly available in accordance with part 734 of the EAR, and it is not eligible for the General Software Note (''mass market'' treatment under License Exception TSU for mass market software). After a technical review, certain encryption software may be released from EI controls and made eligible for the General Software Note treatment as well as other provisions of the EAR applicable to software. Refer to §742.15(b)(1) of the EAR, and Supplement No. 6 to part 742 of the EAR.

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports of software controlled under 5D002 and exported under License Exception GOV.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: See also 5D992. This entry does not control ''software'' ''required'' for the ''use'' of equipment excluded from control under to 5A002 or ''software'' providing any of the functions of equipment excluded from control under 5A002.

Related Definitions: N/A

Items: a. ''Software'' specially designed or modified for the ''development'', ''production'' or ''use'' of equipment or ''software'' controlled by 5A002, 5B002 or 5D002.

b. ''Software'' specially designed or modified to support ''technology'' controlled by 5E002.

c. Specific ''software'' as follows:

c.1. ''Software'' having the characteristics, or performing or simulating the functions of the equipment controlled by 5A002 or 5B002;

c.2. ''Software'' to certify ''software'' controlled by 5D002.c.1.

5D992 "Software" not controlled by 5D002.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to 5D992.a and .b	AT Column 1
AT applies to 5D992.c	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: a. ''Software'', specially designed or modified for the ''development'', ''production'', or ''use'' of information security or cryptologic equipment (e.g., equipment controlled by 5A992)

b. ''Software'' having the characteristics, or performing or simulating the functions of the equipment controlled by 5A992.

c. ''Software'' designed or modified to protect against malicious computer damage, e.g., viruses.

E. TECHNOLOGY

5E002 "Technology" according to the General Technology Note for the "development", "production" or "use" of equipment controlled by 5A002 or 5B002 or "software" controlled by 5D002.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, EI

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

EI applies to encryption items transferred from the U.S. Munitions List to the Commerce Control List consistent with E.O. 13026

of November 15, 1996 (61 FR 58767) and pursuant to the Presidential Memorandum of that date.

Refer to §742.15 of the EAR

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 5E992
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E992 "Technology", n.e.s., for the "development", "production", or "use" of "information security" or cryptologic equipment (e.g., equipment controlled by 5A992), or "software" controlled by 5D992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 6—Sensors and Lasers

A. SYSTEMS, EQUIPMENT AND COMPONENTS

6A001 Acoustics.

LICENSE REQUIREMENTS

Reason for Control: NS, ATO

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $3000; N/A for 6A001.a.2.a.1, a.2.a.2, a.2.a.7, a.2.b; processing equipment controlled by 6A002.a.2.c, and specially designed for real time application with towed acoustic hydrophone arrays; a.2.e.1, a.2.e.2; and bottom or bay cable systems controlled by 6A002.a.2.e.3 and having processing equipment specially designed for real time application with bottom or bay cable systems
GBS: Yes for 6A001.a.1.b.4
CIV: Yes for 6A001.a.1.b.4

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6A991
Related Definitions: N/A
Items: a. Marine acoustic systems, equipment and specially designed components therefor, as follows: a.1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:

NOTE: 6A001.a.1 does not control:

a. Depth sounders operating vertically below the apparatus, not including a scanning function exceeding ±20°, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;

b. Acoustic beacons, as follows:

1. Acoustic emergency beacons;

2. Pingers specially designed for relocating or returning to an underwater position.

a.1.a. Wide-swath bathymetric survey systems designed for sea bed topographic mapping, having all of the following:

a.1.a.1. Being designed to take measurements at an angle exceeding 20° from the vertical;

a.1.a.2. Being designed to measure depths exceeding 600 m below the water surface; and

a.1.a.3. Being designed to provide any of the following:

a.1.a.3.a. Incorporation of multiple beams any of which is less than 1.9°; or

a.1.a.3.b. Data accuracies of better than 0.3% of water depth across the swath averaged over the individual measurements within the swath;

a.1.b. Object detection or location systems having any of the following:

a.1.b.1. A transmitting frequency below 10 KHz;

a.1.b.2. Sound pressure level exceeding 224 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 10 KHz to 24 KHz inclusive;

a.1.b.3. Sound pressure level exceeding 235 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band between 24 KHz and 30 KHz;

a.1.b.4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 KHz;

a.1.b.5. Designed to operate with an unambiguous display range exceeding 5,120 m; *or*

a.1.b.6. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following:

a.1.b.6.a. Dynamic compensation for pressure; *or*

a.1.b.6.b. Incorporating other than lead zirconate titanate as the transduction element;

a.1.c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination, having any of the following:

NOTES: 1. The control status of acoustic projectors, including transducers, specially designed for other equipment is determined by the control status of the other equipment.

2. 6A001.a.1.c does not control electronic sources that direct the sound vertically only, or mechanical (e.g., air gun or vapor-shock gun) or chemical (e.g., explosive) sources.

a.1.c.1. An instantaneous radiated acoustic power density exceeding 0.01 mW/mm^2/Hz for devices operating at frequencies below 10 KHz;

a.1.c.2. A continuously radiated acoustic power density exceeding 0.001 mW/mm^2/Hz for devices operating at frequencies below 10 KHz;

TECHNICAL NOTE: Acoustic power density is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.

a.1.c.3. Designed to withstand pressure during normal operation at depths exceeding 1,000 m; or

a.1.c.4. Side-lobe suppression exceeding 22 Db;

a.1.d. Acoustic systems, equipment and specially designed components for determining the position of surface vessels or underwater vehicles having any of the following:

NOTE: 6A001.a.1.d includes:

a. Equipment using coherent ''signal processing'' between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle;

b. Equipment capable of automatically correcting speed-of-sound propagation errors for calculation of a point.

a.1.d.1. Designed to operate at a range exceeding 1,000 m with a positioning accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m; or

a.1.d.2. Designed to withstand pressure at depths exceeding 1,000 m;

a.2. Passive (receiving, whether or not related in normal application to separate active equipment) systems, equipment and specially designed components therefor, as follows:

a.2.a. Hydrophones (transducers) having any of the following characteristics:

a.2.a.1. Incorporating continuous flexible sensors or assemblies of discrete sensor elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;

a.2.a.2. Having any of the following sensing elements:

a.2.a.2.a. Optical fibers;

a.2.a.2.b. Piezoelectric polymers; or

a.2.a.2.c. Flexible piezoelectric ceramic materials;

a.2.a.3. A hydrophone sensitivity better than −180 dB at any depth with no acceleration compensation;

a.2.a.4. When designed to operate at depths not exceeding 35 m, a hydrophone sensitivity better than −186 dB with acceleration compensation;

a.2.a.5. When designed for normal operation at depths exceeding 35 m, a hydrophone sensitivity better than −192 dB with acceleration compensation;

a.2.a.6. When designed for normal operation at depths exceeding 100 m, a hydrophone sensitivity better than −204 dB; *or*

a.2.a.7. Designed for operation at depths exceeding 1,000 m;

TECHNICAL NOTE: Hydrophone sensitivity is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field with an rms pressure of 1 μPa. For example, a hydrophone of −160 dB (reference 1 V per μPa) would yield an output voltage of 10^{-8} V in such a field, while one of −180 dB sensitivity would yield only 10^{-9} V output. Thus, −160 dB is better than −180 dB.

a.2.b. Towed acoustic hydrophone arrays having any of the following:

a.2.b.1. Hydrophone group spacing of less than 12.5 m;

a.2.b.2. Hydrophone group spacing of 12.5 m to less than 25 m and designed or able to be modified to operate at depths exceeding 35 m;

TECHNICAL NOTE: ''Able to be modified'' in 6A001.a.2.b.2 means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.

a.2.b.3. Hydrophone group spacing of 25 m or more and designed to operate at depths exceeding 100 m;

a.2.b.4. Heading sensors controlled by 6A001.a.2.d;

a.2.b.5. Longitudinally reinforced array hoses;

a.2.b.6. An assembled array of less than 40 mm in diameter;

a.2.b.7. Multiplexed hydrophone group signals designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; *or*

a.2.b.8. Hydrophone characteristics controlled by 6A001.a.2.a;

a.2.c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having ''user accessible programmability'' and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

a.2.d. Heading sensors having all of the following:

a.2.d.1. An accuracy of better than ±0.5°; *and*

a.2.d.2. Any of the following:

a.2.d.2.a. Designed to be incorporated within the array hosing and to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; *or*

a.2.d.2.b. Designed to be mounted external to the array hosing and having a sensor unit capable of operating with 360° roll at depths exceeding 35 m;

a.2.e. Bottom or bay cable systems having any of the following:

a.2.e.1. Incorporating hydrophones controlled by 6A001.a.2.a;

a.2.e.2. Incorporating multiplexed hydrophone group signals designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; or

a.2.e.3. Processing equipment, specially designed for bottom or bay cable systems, having ''user accessible programmability'' and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

b. Correlation-velocity sonar log equipment designed to measure the horizontal speed of the equipment carrier relative to the sea bed at distances between the carrier and the sea bed exceeding 500 m.

6A002 Optical sensors.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, CC, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2.
MT applies to optical detectors in 6A002.a.1, a.3, and .e that are specially designed or rated as electromagnetic (including ''lasers'') and ionized particle radiation resistant.	MT Column 1.
RS applies to 6A002.a.1, a.2, a.3 and .c.	RS Column 1.
CC applies to police-model infrared viewers in 6A002.c.	CC Column 1,
AT applies to entire entry	AT Column 1.
UN applies to 6A002.a.1, a.2 a.3, and c.	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).
UN applies to 6A002.b	Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $3000, *except* N/A for MT and for 6A002.a.1, a.2, a.3, .c, and .e

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Parts and accessories in $ value

Related Controls: See also 6A102, 6A202, and 6A992

Related Definitions: (1) ''Image intensifiers'' defined in 6A002.a.2 and ''focal plane arrays'' defined in 6A002.a.3 specially designed, modified, or configured for military use and not part of civil equipment are subject to the export licensing authority of U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121). (2) ''Space qualified'' ''monospectral imaging sensors'', and ''multispectral imaging sensors'' defined in 6A002.b, and ''space-qualified'' ''focal plane arrays'' defined in 6A002.e, specially designed or modified for items on the U.S. Munitions List are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls (22 CFR part 121)

Items: a. Optical detectors, as follows:

NOTE: 6A002.a does not control germanium or silicon photodevices.

a.1. ''Space-qualified'' solid-state detectors, as follows:

a.1.a. ''Space-qualified'' solid-state detectors, having all of the following:

a.1.a.1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300 nm; and

a.1.a.2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm;

a.1.b. ''Space-qualified'' solid-state detectors, having all of the following:

a.1.b.1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; and

a.1.b.2. A response ''time constant'' of 95 ns or less;

a.1.c. ''Space-qualified'' solid-state detectors having a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

a.2. Image intensifier tubes and specially designed components therefor, as follows:

a.2.a. Image intensifier tubes having all of the following:

a.2.a.1. A peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm;

a.2.a.2. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of 15 μm or less; and

a.2.a.3. Photocathodes, as follows:

a.2.a.3.a. S–20, S–25 or multialkali photocathodes with a luminous sensitivity exceeding 240 μA/lm;

a.2.a.3.b. GaAs or GaInAs photocathodes; or

a.2.a.3.c. Other III–V compound semiconductor photocathodes;

NOTE: 6A002.a.2.a.3.c does not control compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.2.b. Specially designed components, as follows:

a.2.b.1. Microchannel plates having a hole pitch (center-to-center spacing) of 15 μm or less;

a.2.b.2. GaAs or GaInAs photocathodes;

a.2.b.3. Other III–V compound semiconductor photocathodes;

NOTE: 6A002.a.2.b.3 does not control compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.3. Non-''space-qualified'' ''focal plane arrays'', as follows:

TECHNICAL NOTE: Linear or two-dimensional multi-element detector arrays are referred to as ''focal plane arrays''.

NOTES: 1. 6A002.a.3 includes photoconductive arrays and photovoltaic arrays.

2. 6A002.a.3 does not control silicon ''focal plane arrays'', multi-element (not to exceed 16 elements) encapsulated photoconductive cells or pyroelectric detectors using any of the following:

a. Lead sulphide;

b. Triglycine sulphate and variants;

c. Lead-lanthanum-zirconium titanate and variants;

d. Lithium tantalate;

e. Polyvinylidene fluoride and variants;

f. Strontium barium niobate and variants; *or*

g. Lead selenide.

a.3.a. Non-''space-qualified'' ''focal plane arrays'', having all of the following:

a.3.a.1. Individual elements with a peak response within the wavelength range exceeding 900 nm but not exceeding 1,050 nm; and

a.3.a.2. A response ''time constant'' of less than 0.5 ns;

a.3.b. Non-''space-qualified'' ''focal plane arrays'', having all of the following:

a.3.b.1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,200 nm; and

a.3.b.2. A response ''time constant'' of 95 ns or less;

a.3.c. Non-''space-qualified'' ''focal plane arrays'', having individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm.

b. ''Monospectral imaging sensors'' and ''multispectral imaging sensors'' designed for remote sensing applications, having any of the following:

b.1. An Instantaneous-Field-Of-View (IFOV) of less than 200 μr (microradians); or

b.2. Being specified for operation in the wavelength range exceeding 400 nm but not exceeding 30,000 nm and having all the following;

b.2.a. Providing output imaging data in digital format; *and*

b.2.b. Being any of the following:

b.2.b.1. ''Space-qualified''; or

b.2.b.2. Designed for airborne operation, using other than silicon detectors, and having an IFOV of less than 2.5 mr (milliradians).

c. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating any of the following:

c.1. Image intensifier tubes having the characteristics listed in 6A002.a.2.a; or

c.2. ''Focal plane arrays'' having the characteristics listed in 6A002.a.3.

TECHNICAL NOTE: ''Direct view'' refers to imaging equipment, operating in the visible or infrared spectrum, that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record or store the image photographically, electronically or by any other means.

NOTE: 6A002.c does not control the following equipment incorporating other than GaAs or GaInAs photocathodes:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Medical equipment;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Flame detectors for industrial furnaces;

e. Equipment specially designed for laboratory use.

d. Special support components for optical sensors, as follows:

d.1. ''Space-qualified'' cryocoolers;

d.2. Non-''space-qualified'' cryocoolers, having a cooling source temperature below 218 K (−55° C), as follows:

d.2.a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;

d.2.b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;

d.3. Optical sensing fibers specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive.

e. ''Space qualified'' ''focal plane arrays'' having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.

6A003 Cameras.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2.
NP applies to items controlled in paragraphs 6A003.a.2, a.3 and a.4.	NP Column 1.
RS applies to items controlled in 6A003.b.3 and b.4.	RS Column 1.
AT applies to entire entry	AT Column 1.
UN applies to items controlled in 6A003.b.3 and b.4.	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $1500, except N/A for 6A003.a.2 through a.5, b.1, b.3 and b.4
GBS: Yes for 6A003.a.1
CIV: Yes for 6A003.a.1

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also 6A203. See 8A002.d and .e for cameras specially designed or modified for underwater use.
Related Definitions: N/A
Items: a. Instrumentation cameras, as follows:

a.1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames/s;

NOTE: 6A003.a.1 does not control cinema recording cameras for normal civil purposes.

a.2. Mechanical high speed cameras, in which the film does not move, capable of recording at rates exceeding 1,000,000 frames/s for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;

a.3. Mechanical or electronic streak cameras having writing speeds exceeding 10 mm/μs;

a.4. Electronic framing cameras having a speed exceeding 1,000,000 frames/s;

a.5. Electronic cameras, having all of the following:

a.5.a. An electronic shutter speed (gating capability) of less than 1 μs per full frame; and

a.5.b. A read out time allowing a framing rate of more than 125 full frames per second.

b. Imaging cameras, as follows:

NOTE: 6A003.b does not control television or video cameras specially designed for television broadcasting.

b.1. Video cameras incorporating solid state sensors, having any of the following:

b.1.a. More than 4×10^6 ''active pixels'' per solid state array for monochrome (black and white) cameras;

b.1.b. More than 4×10^6 ''active pixels'' per solid state array for color cameras incorporating three solid state arrays; or

b.1.c. More than 12×10^6 ''active pixels'' for solid state array color cameras incorporating one solid state array;

b.2. Scanning cameras and scanning camera systems, having all of the following:

b.2.a. Linear detector arrays with more than 8,192 elements per array; and

b.2.b. Mechanical scanning in one direction;

b.3. Imaging cameras incorporating image intensifiers having the characteristics listed in 6A002.a.2.a;

b.4. Imaging cameras incorporating ''focal plane arrays'' having the characteristics listed in 6A002.a.3.

6A004 Optics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes for 6A004.a.1, a.2, a.4, b, d.2, and d.4
CIV: Yes for 6A004.a.1, a.2, a.4, b, d.2, and d.4

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; cable in meters/feet; components in $ value
Related Controls: See also 6A994
Related Definitions: N/A
Items: a. Optical mirrors (reflectors), as follows:

a.1. ''Deformable mirrors'' having either continuous or multi-element surfaces, and specially designed components therefor, capable of dynamically repositioning portions of the surface of the mirror at rates exceeding 100 Hz;

a.2. Lightweight monolithic mirrors having an average ''equivalent density'' of less than 30 kg/m^2 and a total mass exceeding 10 kg;

a.3. Lightweight ''composite'' or foam mirror structures having an average ''equivalent density'' of less than 30 kg/m^2 and a total mass exceeding 2 kg;

a.4. Beam steering mirrors more than 100 mm in diameter or length of major axis, that

maintain a flatness of lambda/2 or better (lambda is equal to 633 nm) having a control bandwidth exceeding 100 Hz.

b. Optical components made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and having any of the following:

b.1. Exceeding 100 cm^3 in volume; or

b.2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth).

c. ''Space-qualified'' components for optical systems, as follows:

c.1. Lightweighted to less than 20% ''equivalent density'' compared with a solid blank of the same aperture and thickness;

c.2. Substrates, substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;

c.3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;

c.4. Manufactured from ''composite'' materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction.

d. Optical control equipment, as follows:

d.1. Specially designed to maintain the surface figure or orientation of the ''space-qualified'' components controlled by 6A004.c.1 or 6A004.c.3;

d.2. Having steering, tracking, stabilization or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 µr (microradians) or less;

d.3. Gimbals having all of the following:

d.3.a. A maximum slew exceeding 5°;

d.3.b. A bandwidth of 100 Hz or more;

d.3.c. Angular pointing errors of 200 µr (microradians) or less; *and*

d.3.d. Having any of the following:

d.3.d.1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 2 r (radians)/s^2; or

d.3.d.2. Exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 0.5 r (radians)/s^2;

d.4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more.

6A005 "Lasers", components and optical equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS.

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 6A005.a.1.c, a.2.a (with an output power > 40W), a.4.c, a.6, (argon ion lasers only), c.1.b (with an output power > 30W), c.2.c.2.a (with an output power > 40W), c.2.c.2.b (with an output power > 40W), c.2.d.2.b (with an output power > 40W), and d.2.c.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A for NP items
$3000 for all other items

GBS: Yes, for 6A005.d (except d.2.c), CO_2 or CO/CO_2 ''lasers'' having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 Kw; CO ''lasers'' having a CW maximum rated single or multimode output power not exceeding 10 Kw; CO_2 ''lasers'' controlled by 6A005.a.4 that operate in CW multiple-transverse mode; and having a CW output power not exceeding 15 Kw; Neodymium-doped (other than glass), pulse-excited, ''Q-switched lasers'' controlled by 6A005.c.2.b.2.b having a pulse duration equal to or more than 1 ns; and a multiple-transverse mode output with a ''peak power'' not exceeding 400 MW; Neodymium-doped (other than glass) ''lasers'' controlled by 6A005.c.2.b.3.b or 6A005.c.2.b.4.b that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm; and an average or CW output power not exceeding 2 Kw; and operate in a pulse-excited, non-''Q-switched'' multiple-transverse mode; or in a continuously excited, multiple-transverse mode; and 6A005.g.1.

CIV: Yes, for 6A005..d (except d.2.c), CO_2 or CO/CO_2 ''lasers'' having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 Kw; CO ''lasers'' having a CW maximum rated single or multimode output power not exceeding 10 Kw; CO_2 ''lasers'' controlled by 6A005.a.4 that operate in CW multiple-transverse mode; and having a CW output power not exceeding 15 Kw; Neodymium-doped (other than glass), pulse-excited, ''Q-switched lasers'' controlled by 6A005.c.2.b.2.b having a pulse duration equal to or more than 1 ns; and a multiple-transverse mode output with a ''peak power'' not exceeding 400 MW; Neodymium-doped (other than glass) ''lasers'' controlled by 6A005.c.2.b.3.b or 6A005.c.2.b.4.b that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm; and an average or CW output

power not exceeding 2 Kw; and operate in a pulse-excited, non-''Q-switched'' multiple-transverse mode; or in a continuously excited, multiple-transverse mode; and 6A005.g.1.

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: See also 6A205, 6A995, 0B001.g.5 and 0B001.b.6. Shared aperture optical elements, capable of operating in ''super-high power laser'' applications are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: (1) Pulsed ''lasers'' include those that run in a continuous wave (CW) mode with pulses superimposed. (2) Pulse-excited ''lasers'' include those that run in a continuously excited mode with pulse excitation superimposed. (3) The control status of Raman ''lasers'' is determined by the parameters of the pumping source ''lasers''. The pumping source ''lasers'' can be any of the ''lasers'' described as follows:

Items: a. Gas ''lasers'', as follows:

a.1. Excimer ''lasers'', having any of the following:

a.1.a. An output wavelength not exceeding 150 nm and having any of the following:

a.1.a.1. An output energy exceeding 50 mJ per pulse; *or*

a.1.a.2. An average or CW output power exceeding 1 W;

a.1.b. An output wavelength exceeding 150 nm but not exceeding 190 nm and having any of the following:

a.1.b.1. An output energy exceeding 1.5 J per pulse; *or*

a.1.b.2. An average or CW output power exceeding 120 W;

a.1.c. An output wavelength exceeding 190 nm but not exceeding 360 nm and having any of the following:

a.1.c.1. An output energy exceeding 10 J per pulse; or

a.1.c.2. An average or CW output power exceeding 500 W; or

a.1.d. An output wavelength exceeding 360 nm and having any of the following:

a.1.d.1. An output energy exceeding 1.5 J per pulse; or

a.1.d.2. An average or CW output power exceeding 30 W;

a.2. Metal vapor ''lasers'', as follows:

a.2.a. Copper (Cu) ''lasers'' having an average or CW output power exceeding 20 W;

a.2.b. Gold (Au) ''lasers'' having an average or CW output power exceeding 5 W;

a.2.c. Sodium (Na) ''lasers'' having an output power exceeding 5 W;

a.2.d. Barium (Ba) ''lasers'' having an average or CW output power exceeding 2 W;

a.3. Carbon monoxide (CO) ''lasers'' having any of the following:

a.3.a. An output energy exceeding 2 J per pulse and a pulsed ''peak power'' exceeding 5 Kw; or

a.3.b. An average or CW output power exceeding 5 Kw;

a.4. Carbon dioxide (CO_2) ''lasers'' having any of the following:

a.4.a. A CW output power exceeding 15 Kw;

a.4.b. A pulsed output having a ''pulse duration'' exceeding 10 µs and having any of the following:

a.4.b.1. An average output power exceeding 10 Kw; *or*

a.4.b.2. A pulsed ''peak power'' exceeding 100 Kw; *or*

a.4.c. A pulsed output having a ''pulse duration'' equal to or less than 10 µs; and having any of the following:

a.4.c.1. A pulse energy exceeding 5 J per pulse; *or*

a.4.c.2. An average output power exceeding 2.5 Kw;

a.5. ''Chemical lasers'', as follows:

a.5.a. Hydrogen Fluoride (HF) ''lasers'';

a.5.b. Deuterium Fluoride (DF) ''lasers'';

a.5.c. ''Transfer lasers'', as follows:

a.5.c.1. Oxygen Iodine (O_2–I) ''lasers'';

a.5.c.2. Deuterium Fluoride-Carbon dioxide (DF–CO_2) ''lasers'';

a.6. Gas discharge and ion ''lasers'' (i.e., krypton ion or argon ion ''lasers'') having any of the following:

a.6.a. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 50 W; or

a.6.b. An average or CW output power exceeding 50 W;

a.7. Other gas ''lasers'', having any of the following:

NOTE: 6A005.a.7 does not control nitrogen ''lasers''.

a.7.a. An output wavelength not exceeding 150 nm and having any of the following:

a.7.a.1. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

a.7.a.2. An average or CW output power exceeding 1 W;

a.7.b. An output wavelength exceeding 150 nm but not exceeding 800 nm and having any of the following:

a.7.b.1. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 30 W; or

a.7.b.2. An average or CW output power exceeding 30 W;

a.7.c. An output wavelength exceeding 800 nm but not exceeding 1,400 nm and having any of the following:

a.7.c.1. An output energy exceeding 0.25 J per pulse and a pulsed ''peak power'' exceeding 10 W; or

a.7.c.2. An average or CW output power exceeding 10 W; or

a.7.d. An output wavelength exceeding 1,400 nm and an average or CW output power exceeding 1 W.

b. Individual, multiple-transverse mode semiconductor ''lasers'' and arrays of individual semiconductor ''lasers'', having any of the following:

b.1. An output energy exceeding 500 μJ per pulse and a pulsed ''peak power'' exceeding 10 W; or

b.2. An average or CW output power exceeding 10 W.

TECHNICAL NOTE: Semiconductor ''lasers'' are commonly called ''laser'' diodes.

NOTE 1: 6A005.b includes semiconductor ''lasers'' having optical output connectors (e.g. fiber optic pigtails).

NOTE 2: The control status of semiconductor ''lasers'' specially designed for other equipment is determined by the control status of the other equipment.

c. Solid state ''lasers'', as follows:

c.1. ''Tunable'' ''lasers'' having any of the following:

NOTE: 6A005.c.1 includes titanium—sapphire (Ti: Al_2O_3), thulium—YAG (Tm: YAG), thulium—YSGG (Tm: YSGG), alexandrite (Cr: $BeAl_2O_4$) and color center ''lasers''.

c.1.a. An output wavelength less than 600 nm and having any of the following:

c.1.a.1. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

c.1.a.2. An average or CW output power exceeding 1 W;

c.1.b. An output wavelength of 600 nm or more but not exceeding 1,400 nm and having any of the following:

c.1.b.1. An output energy exceeding 1 J per pulse and a pulsed ''peak power'' exceeding 20 W; or

c.1.b.2. An average or CW output power exceeding 20 W; or

c.1.c. An output wavelength exceeding 1,400 nm and having any of the following:

c.1.c.1. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

c.1.c.2. An average or CW output power exceeding 1 W;

c.2. Non-''tunable'' ''lasers'', as follows:

NOTE: 6A005.c.2 includes atomic transition solid state ''lasers''.

c.2.a. Neodymium glass ''lasers'', as follows:

c.2.a.1. ''Q-switched lasers'' having any of the following:

c.2.a.1.a. An output energy exceeding 20 J but not exceeding 50 J per pulse and an average output power exceeding 10 W; or

c.2.a.1.b. An output energy exceeding 50 J per pulse;

c.2.a.2. Non-''Q-switched lasers'' having any of the following:

c.2.a.2.a. An output energy exceeding 50 J but not exceeding 100 J per pulse and an average output power exceeding 20 W; or

c.2.a.2.b. An output energy exceeding 100 J per pulse;

c.2.b. Neodymium-doped (other than glass) ''lasers'', having an output wavelength exceeding 1,000 nm but not exceeding 1,100 nm, as follows:

N.B.: For neodymium-doped (other than glass) ''lasers'' having an output wavelength not exceeding 1,000 nm or exceeding 1,100 nm, see 6A005.c.2.d.

c.2.b.1. Pulse-excited, mode-locked, ''Q-switched lasers'' having a ''pulse duration'' of less than 1 ns and having any of the following:

c.2.b.1.a. A ''peak power'' exceeding 5 GW;

c.2.b.1.b. An average output power exceeding 10 W; or

c.2.b.1.c. A pulsed energy exceeding 0.1 J;

c.2.b.2. Pulse-excited, ''Q-switched lasers'' having a pulse duration equal to or more than 1 ns, and having any of the following:

c.2.b.2.a. A single-transverse mode output having:

c.2.b.2.a.1. A ''peak power'' exceeding 100 MW;

c.2.b.2.a.2. An average output power exceeding 20 W; or

c.2.b.2.a.3. A pulsed energy exceeding 2 J; or

c.2.b.2.b. A multiple-transverse mode output having:

c.2.b.2.b.1. A ''peak power'' exceeding 400 MW;

c.2.b.2.b.2. An average output power exceeding 2 kW; or

c.2.b.2.b.3. A pulsed energy exceeding 2 J;

c.2.b.3. Pulse-excited, non-''Q-switched lasers'', having:

c.2.b.3.a. A single-transverse mode output having:

c.2.b.3.a.1. A ''peak power'' exceeding 500 kW; or

c.2.b.3.a.2. An average output power exceeding 150 W; or

c.2.b.3.b. A multiple-transverse mode output having:

c.2.b.3.b.1. A ''peak power'' exceeding 1 MW; or

c.2.b.3.b.2. An average power exceeding 2 kW;

c.2.b.4. Continuously excited ''lasers'' having:

c.2.b.4.a. A single-transverse mode output having:

c.2.b.4.a.1. A ''peak power'' exceeding 500 kW; or

c.2.b.4.a.2. An average or CW output power exceeding 150 W; or

c.2.b.4.b. A multiple-transverse mode output having:

c.2.b.4.b.1. A ''peak power'' exceeding 1 MW; or

c.2.b.4.b.2. An average or CW output power exceeding 2 kW;

c.2.c. Other non-''tunable'' ''lasers'', having any of the following:

c.2.c.1. A wavelength less than 150 nm and having any of the following:

c.2.c.1.a. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

c.2.c.1.b. An average or CW output power exceeding 1 W;

c.2.c.2. A wavelength of 150 nm or more but not exceeding 800 nm and having any of the following:

c.2.c.2.a. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 30 W; or

c.2.c.2.b. An average or CW output power exceeding 30 W;

c.2.c.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm, as follows:

c.2.c.3.a. ''Q-switched lasers'' having:

c.2.c.3.a.1. An output energy exceeding 0.5 J per pulse and a pulsed ''peak power'' exceeding 50 W; or

c.2.c.3.a.2. An average output power exceeding:

c.2.c.3.a.2.a. 10 W for single-mode ''lasers'';

c.2.c.3.a.2.b. 30 W for multimode ''lasers'';

c.2.c.3.b. Non-''Q-switched lasers'' having:

c.2.c.3.b.1. An output energy exceeding 2 J per pulse and a pulsed ''peak power'' exceeding 50 W; or

c.2.c.3.b.2. An average or CW output power exceeding 50 W; or

c.2.c.4. A wavelength exceeding 1,400 nm and having any of the following:

c.2.c.4.a. An output energy exceeding 100 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

c.2.c.4.b. An average or CW output power exceeding 1 W;

d. Dye and other liquid ''lasers'', having any of the following:

d.1. A wavelength less than 150 nm and:

d.1.a. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

d.1.b. An average or CW output power exceeding 1 W;

d.2. A wavelength of 150 nm or more but not exceeding 800 nm and having any of the following:

d.2.a. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 20 W;

d.2.b. An average or CW output power exceeding 20 W; or

d.2.c. A pulsed single longitudinal mode oscillator having an average output power exceeding 1 W and a repetition rate exceeding 1 KHz if the ''pulse duration'' is less than 100 ns;

d.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm and having any of the following:

d.3.a. An output energy exceeding 0.5 J per pulse and a pulsed ''peak power'' exceeding 10 W; or

d.3.b. An average or CW output power exceeding 10 W; or

d.4. A wavelength exceeding 1,400 nm and having any of the following:

d.4.a. An output energy exceeding 100 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

d.4.b. An average or CW output power exceeding 1 W;

e. Components, as follows:

e.1. Mirrors cooled either by active cooling or by heat pipe cooling;

TECHNICAL NOTE: Active cooling is a cooling technique for optical components using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.

e.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with controlled ''lasers'';

f. Optical equipment, as follows:

(For shared aperture optical elements, capable of operating in ''Super-High Power Laser'' (''SHPL'') applications, see the U.S. Munitions List.)

f.1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront having any of the following:

f.1.a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam's wavelength; or

f.1.b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam's wavelength;

f.2. ''Laser'' diagnostic equipment capable of measuring ''SHPL'' system angular beam steering errors of equal to or less than 10 μrad;

f.3. Optical equipment and components specially designed for a phased-array ''SHPL'' system for coherent beam combination to an accuracy of lambda/10 at the designed wavelength, or 0.1 μm, whichever is the smaller;

f.4. Projection telescopes specially designed for use with ''SHPL'' systems.

6A006 "Magnetometers", "magnetic gradiometers", "intrinsic magnetic gradiometers" and compensation systems, and specially designed components therefor, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $1500

GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6A996. This entry does not control instruments specially designed for biomagnetic measurements for medical diagnostics.
Related Definitions: N/A
Items: a. ''Magnetometers'' using ''superconductive'', optically pumped or nuclear precession (proton/Overhauser) ''technology'' having a ''noise level'' (sensitivity) lower (better) than 0.05 nT rms per square root Hz;

b. Induction coil ''magnetometers'' having a ''noise level'' (sensitivity) lower (better) than any of the following:

b.1. 0.05 nT rms/square root Hz at frequencies of less than 1 Hz;

b.2. 1×10^{-3} nT rms/square root Hz at frequencies of 1 Hz or more but not exceeding 10 Hz; or

b.3. 1×10^{-4} nT rms/square root Hz at frequencies exceeding 10 Hz;

c. Fiber optic ''magnetometers'' having a ''noise level'' (sensitivity) lower (better) than 1 nT rms per square root Hz;

d. ''Magnetic gradiometers'' using multiple ''magnetometers'' controlled by 6A006.a, 6A006.b or 6A006.c;

e. Fiber optic ''intrinsic magnetic gradiometers'' having a magnetic gradient field ''noise level'' (sensitivity) lower (better) than 0.3 nT/m rms per square root Hz;

f. ''Intrinsic magnetic gradiometers'', using ''technology'' other than fiber-optic ''technology'', having a magnetic gradient field ''noise level'' (sensitivity) lower (better) than 0.015 nT/m rms per square root Hz;

g. Magnetic compensation systems for magnetic sensors designed for operation on mobile platforms;

h. ''Superconductive'' electromagnetic sensors, components manufactured from ''superconductive'' materials:

h.1. Designed for operation at temperatures below the ''critical temperature'' of at least one of their ''superconductive'' constituents (including Josephson effect devices or ''superconductive'' quantum interference devices (SQUIDS));

h.2. Designed for sensing electromagnetic field variations at frequencies of 1 KHz or less; and

h.3. Having any of the following characteristics:

h.3.a. Incorporating thin-film SQUIDS with a minimum feature size of less than 2 µm and with associated input and output coupling circuits;

h.3.b. Designed to operate with a magnetic field slew rate exceeding 1×10^6 magnetic flux quanta per second;

h.3.c. Designed to function without magnetic shielding in the earth's ambient magnetic field; or

h.3.d. Having a temperature coefficient less (smaller) than 0.1 magnetic flux quantum/K.

6A007 Gravity meters (gravimeters) and gravity gradiometers, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to 6A007.b and .c when the accuracies in 6A007.b.1 and b.2 are met or exceeded.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000; N/A for MT
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6A107 and 6A997
Related Definitions: N/A
Items: a. Gravity meters for ground use having a static accuracy of less (better) than 10 µgal;

NOTE: 6A007.a does not control ground gravity meters of the quartz element (Worden) type.

b. Gravity meters for mobile platforms for ground, marine, submersible, space or airborne use, having all of the following:

b.1. A static accuracy of less (better) than 0.7 mgal; and

b.2. An in-service (operational) accuracy of less (better) than 0.7 mgal having a time-to-steady-state registration of less than 2 minutes under any combination of attendant corrective compensations and motional influences;

c. Gravity gradiometers.

6A008 Radar systems, equipment and assemblies having any of the characteristics (see List of Items Controlled), and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to items that are designed for airborne applications and that are usable in systems controlled for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000; N/A for MT and 6A008.l.3

GBS: Yes, for 6A008.b, .c, and l.1 only
CIV: Yes, for 6A008.b, .c, and l.1 only

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6A108 and 6A998. This entry does not control: (1) Secondary surveillance radar (SSR); (2) Car radar designed for collision prevention; (3) Displays or monitors used for Air Traffic Control (ATC) having no more than 12 resolvable elements per mm; (4) Meteorological (weather) radar.
Related Definitions: N/A
Items: a. Operating at frequencies from 40 GHz to 230 GHz and having an average output power exceeding 100 mW;

b. Having a tunable bandwidth exceeding ± 6.25% of the center operating frequency;

TECHNICAL NOTE: The center operating frequency equals one half of the sum of the highest plus the lowest specified operating frequencies.

c. Capable of operating simultaneously on more than two carrier frequencies;

d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;

e. Incorporating ''electronically steerable phased array antennae'';

f. Capable of heightfinding non-cooperative targets;

NOTE: 6A008.f does not control precision approach radar (PAR) equipment conforming to ICAO standards.

g. Specially designed for airborne (balloon or airframe mounted) operation and having Doppler ''signal processing'' for the detection of moving targets;

h. Employing processing of radar signals using any of the following:

h.1. ''Radar spread spectrum'' techniques; or

h.2. ''Radar frequency agility'' techniques;

i. Providing ground-based operation with a maximum ''instrumented range'' exceeding 185 km;

NOTE: 6A008.i does not control:

a. Fishing ground surveillance radar;

b. Ground radar equipment specially designed for enroute air traffic control, provided that all the following conditions are met:

1. It has a maximum ''instrumented range'' of 500 km or less;

2. It is configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centers;

3. It contains no provisions for remote control of the radar scan rate from the enroute ATC center; and

4. It is to be permanently installed;

c. Weather balloon tracking radars.

j. Being ''laser'' radar or Light Detection and Ranging (LIDAR) equipment, having any of the following:

j.1. ''Space-qualified''; or

j.2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 μr (microradians);

NOTE: 6A008.j does not control LIDAR equipment specially designed for surveying or for meteorological observation.

k. Having ''signal processing'' sub-systems using ''pulse compression'', with any of the following:

k.1. A ''pulse compression'' ratio exceeding 150; or

k.2. A pulse width of less than 200 ns; or

l. Having data processing sub-systems with any of the following:

l.1. ''Automatic target tracking'' providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage;

NOTE: 6A008.l.1 does not control conflict alert capability in ATC systems, or marine or harbor radar.

l.2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates;

l.3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; or

l.4. Superposition and correlation, or fusion, of target data from two or more ''geographically dispersed'' and ''interconnected radar sensors'' to enhance and discriminate targets.

NOTE: 6A008.l.4 does not control systems, equipment and assemblies used for marine traffic control.

6A018 Magnetic, pressure, and acoustic underwater detection devices specially designed for military purposes and controls and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $5000, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number;components in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A102 Radiation hardened detectors, other than those controlled by 6A002, for use in protecting against nuclear effects (e.g. electromagnetic pulse (EMP), X-rays, combined blast and thermal effects) and usable for "missiles", designed or rated to withstand radiation levels that meet or exceed a total irradiation dose of 5×10^5 rads (Si).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Components in number
Related Controls: N/A
Related Definitions: In this entry, a detector is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material.
Items: The list of items controlled is contained in the ECCN heading.

6A107 Gravity meters (gravimeters), gravity gradiometers, and specially designed components therefore, other than those controlled by 6A007.b and .c, designed or modified for airborne or marine use, having a static or operational accuracy of 7×10^{-6} m/sec^2 (0.7 milligal) or better, and a time to steady-state registration of two minutes or less.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A108 Radar systems and tracking systems, other than those controlled by 6A008, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) This entry does not control airborne civil weather radar conforming to international standards for civil weather radars provided that they do not incorporate any of the following: (a) Phased array antennas; (b) Frequency agility; (c) Spread spectrum; or (d) Signal processing specially designed for the tracking of vehicles. (2) Items in 6A108.a that are specially designed or modified for ''missiles'' or for items on the U.S. Munitions List are subject to the export licensing authority of the U.S. Department of State, Defense Trade Controls (see 22 CFR part 121).
Related Definitions: Laser radar systems are defined as those that embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.
Items: a. Radar and laser radar systems designed or modified for use in ''missiles'';

b. Precision tracking systems, usable for ''missiles'', as follows:

b.1. Tracking systems that use a code translator in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;

b.2. Range instrumentation radars including associated optical/infrared trackers with all of the following capabilities:

b.2.a. Angular resolution better than 3 milliradians (0.5 mils);

b.2.b. Range of 30 km or greater with a range resolution better than 10 m rms;

b.2.c. Velocity resolution better than 3 m/s.

6A202 Photomultiplier tubes with a photocathode area of greater than 20 cm^2 having an anode pulse rise time of less than 1 ns.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A203 Cameras and components, other than those controlled by 6A003, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment and components in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Mechanical rotating mirror cameras, as follows, and specially designed components therefor:

a.1. Framing cameras with recording rates greater than 225,000 frames per second; or

a.2. Streak cameras with writing speeds greater than 0.5 mm per microsecond;

NOTE: Components of such cameras include their synchronizing electronic units and rotor assemblies consisting of turbines, mirrors and bearings.

b. Electronic streak and framing cameras and tubes, as follows:

b.1. Electronic streak cameras capable of 50 ns or less time resolution and streak tubes therefor;

b.2. Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;

b.3. Framing tubes and solid-state imaging devices for use with cameras controlled by 6A203.b.2, as follows:

b.3.a. Proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;

b.3.b. Gate silicon intensifier target (SIT) videcon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;

b.3.c. Kerr or pocket cell electro-optical shuttering; or

b.3.d. Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras controlled by 6A203.b.2;

c. Radiation-hardened TV cameras, or lenses therefor, specially designed or rated as radiation hardened to withstand greater than 50×10^3 grays (Silicon) (5×10^6 rad (Silicon)) without operational degradation.

6A205 "Lasers", other than those controlled 6A005, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 0B001.g.5 and 0B001.h.6
Related Definitions: N/A
Items: a. Argon ion ''lasers'' with greater than 40 W average output power operating at wavelengths between 400 nm and 515 nm;

b. Tunable pulsed single-mode dye oscillators capable of an average power output of greater than 1 W, a repetition rate greater than 1 KHz, a pulse less than 100 ns, and a wavelength between 300 nm and 800 nm;

c. Tunable pulsed dye laser amplifiers and oscillators, with an average power output of greater than 30 W, a repetition rate greater than 1 KHz, a pulse width less than 100 ns, and a wavelength between 300 nm and 800 nm, except single mode oscillators;

d. Pulsed carbon dioxide ''lasers'' with a repetition rate greater than 250 Hz, an average power output of greater than 500 W, and a pulse of less than 200 ns operating at wavelengths between 9,000 nm and 11,000 nm;

e. Para-hydrogen Raman shifters designed to operate at 16 micrometer output wavelength and at a repetition rate greater than 250 Hz;

f. Pulse-excited, Q-switched Neodymium-doped (other than glass) ''lasers'', having all of the following:

f.1. An output wavelength exceeding 1,000 nm but not exceeding 1,100 nm;

f.2. A pulse duration equal to or more than 1 ns; *and*

f.3. A multiple-transverse mode output having an average power exceeding 50 W.

6A225 Velocity interferometers for measuring velocities in excess of 1 km/s during time intervals of less than 10 microsecond (VISARs, Doppler laser interferometers (DLIs), etc.).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A226 Pressure sensors, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Manganin gauges for pressures greater than 100 kilobars; *or*

b. Quartz pressure transducers for pressures greater than 100 kilobars.

6A991 Marine or terrestrial acoustic equipment, n.e.s., capable of detecting or locating underwater objects or features or positioning surface vessels or underwater vehicles; and specially designed components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A992 Optical Sensors, not controlled by 6A002.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Image intensifier tubes and specially designed components therefor, as follows:

a.1. Image intensifier tubes having all the following:

a.1.a. A peak response in wavelength range exceeding 400 nm, but not exceeding 1,050 nm;

a.1.b. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of less than 25 micrometers; and

a.1.c. Having any of the following:

a.1.c.1. An S–20, S–25 or multialkali photocathode; or

a.1.c.2. A GaAs or GaInAs photocathode;

a.2. Specially designed microchannel plates having both of the following characteristics:

a.2.a. 15,000 or more hollow tubes per plate; and

a.2.b. Hole pitch (center-to-center spacing) of less than 25 micrometers.

6A994 Optics, not controlled by 6A004.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Optical filters:

a.1. For wavelengths longer than 250 nm, comprised of multi-layer optical coatings and having either of the following:

a.1.a. Bandwidths equal to or less than 1 nm Full Width Half Intensity (FWHI) and peak transmission of 90% or more; or

a.1.b. Bandwidths equal to or less than 0.1 nm FWHI and peak transmission of 50% or more;

NOTE: 6A994 does not control optical filters with fixed air gaps or Lyot-type filters.

a.2. For wavelengths longer than 250 nm, and having all of the following:

a.2.a. Tunable over a spectral range of 500 nm or more;

a.2.b. Instantaneous optical bandpass of 1.25 nm or less;

a.2.c. Wavelength resettable within 0.1 ms to an accuracy of 1 nm or better within the tunable spectral range; and

a.2.d. A single peak transmission of 91% or more;

a.3. Optical opacity switches (filters) with a field of view of 30° or wider and a response time equal to or less than 1 ns;

b. ''Fluoride fiber'' cable, or optical fibers therefor, having an attenuation of less than 4 dB/km in the wavelength range exceeding 1,000 nm but not exceeding 3,000 nm.

6A995 "Lasers", not controlled by 6A005 or 6A205.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Carbon dioxide (CO_2) ''lasers'' having any of the following:

a.1. A CW output power exceeding 10 kW;

a.2. A pulsed output with a ''pulse duration'' exceeding 10 microseconds; *and*

a.2.a. An average output power exceeding 10 kW; or

a.2.b. A pulsed ''peak power'' exceeding 100 kW; or

a.3. A pulsed output with a ''pulse duration'' equal to or less than 10 microseconds; and

a.3.a. A pulse energy exceeding 5 J per pulse and ''peak power'' exceeding 2.5 kW; or

a.3.b. An average output power exceeding 2.5 kW;

b. Semiconductor lasers, as follows:

b.1. Individual, single-transverse mode semiconductor ''lasers'' having:

b.1.a. An average output power exceeding 100 mW; or

b.1.b. A wavelength exceeding 1,050 nm;

b.2. Individual, multiple-transverse mode semiconductor ''lasers'', or arrays of individual semiconductor ''lasers'', having a wavelength exceeding 1,050 nm;

c. Solid state, non-''tunable'' ''lasers'', as follows:

c.1. Ruby ''lasers'' having an output energy exceeding 20 J per pulse;

c.2. Neodymium-doped (other than glass) ''lasers'', as follows, with an output wavelength exceeding 1,000 nm but not exceeding 1,100 nm:

c.2.a. Pulse-excited, ''Q-switched lasers'', with a pulse duration equal to or more than 1 ns, and a multiple-transverse mode output with any of the following:

c.2.a.1. A ''peak power'' exceeding 200 mW; or

c.2.a.2. An average output power exceeding 50 W;

c.2.b. Pulse-excited, non-''Q-switched lasers'', having a multiple-transverse mode output with an average power exceeding 500 W; or

c.2.c. Continuously excited ''lasers'' having a multiple-transverse mode output with an average or CW output power exceeding 500 W;

d. Free electron ''lasers''.

6A996 "Magnetometers", n.e.s., having a "noise level" (sensitivity) lower (better) than 1.0 nT rms per square root Hz.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A997 Gravity meters (gravimeters) for ground use, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Having a static accuracy of less (better) than 100 microgal; or

b. Being of the quartz element (Worden) type.

6A998 Airborne radar equipment, n.e.s., and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

6B004 Optical equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes for 6B004.b
CIV: Yes for 6B004.b

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: This entry does not control microscopes.
Related Definitions: N/A
Items: a. Equipment for measuring absolute reflectance to an accuracy of ±0.1% of the reflectance value;

b. Equipment other than optical surface scattering measurement equipment, having an unobscured aperture of more than 10 cm, specially designed for the non-contact optical measurement of a non-planar optical surface figure (profile) to an ''accuracy'' of 2 nm or less (better) against the required profile.

6B007 Equipment to produce, align and calibrate land-based gravity meters with a static accuracy of better than 0.1 mgal.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6B008 Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also 6B108
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6B108 Systems, other than those controlled by 6B008, specially designed for radar cross section measurement usable for "missiles" and other subsystems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: r
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6B995 Specially designed or modified equipment, including tools, dies, fixtures or gauges, and other specially designed components and accessories therefor:

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. For the manufacture or inspection of:

a.1. Free electron ''laser'' magnet wigglers;
a.2. Free electron ''laser'' photo injectors;
b. For the adjustment, to required tolerances, of the longitudinal magnetic field of free electron ''lasers''.

C. MATERIALS

6C002 Optical sensor materials, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also 6C992
Related Definitions: N/A
Items: a. Elemental tellurium (Te) of purity levels of 99.9995% or more;

b. Single crystals of cadmium telluride (CdTe), cadmium zinc telluride (CdZnTe) or mercury cadmium telluride (HgCdTe) of any purity level, including epitaxial wafers thereof.

6C004 Optical materials, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: Yes for 6C004.a and .e
CIV: Yes for 6C004.a and .e

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6C994
Related Definitions: N/A
Items: a. Zinc selenide (ZnSe) and zinc sulphide (ZnS) ''substrate blanks'' produced by the chemical vapor deposition process, having any of the following:

a.1. A volume greater than 100 cm3; or
a.2. A diameter greater than 80 mm having a thickness of 20 mm or more;
b. Boules of the following electro-optic materials:
b.1. Potassium titanyl arsenate (KTA);
b.2. Silver gallium selenide ($AgGaSe_2$);
b.3. Thallium arsenic selenide (Tl_3AsSe_3, also known as TAS;
c. Non-linear optical materials, having all of the following:
c.1. Third order susceptibility (chi 3) of 10^{-6} m^2/V^2 or more; and
c.2. A response time of less than 1 ms;
d. ''Substrate blanks'' of silicon carbide or beryllium beryllium (Be/Be) deposited materials exceeding 300 mm in diameter or major axis length;
e. Glass, including fused silica, phosphate glass, fluorophosphate glass, zirconium fluoride (ZrF_4) and hafnium fluoride (HfF_4), having all of the following:
e.1. A hydroxyl ion (OH-) concentration of less than 5 ppm;
e.2. Integrated metallic purity levels of less than 1 ppm; and
e.3. High homogeneity (index of refraction variance) less than 5×10^{-6};
f. Synthetically produced diamond material with an absorption of less than 10^{-5} cm^{-1} for wavelengths exceeding 200 nm but not exceeding 14,000 nm.

6C005 Synthetic crystalline "laser" host material in unfinished form, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Titanium doped sapphire;

b. Alexandrite.

6C992 Optical sensing fibers not controlled by 6A002.d.3 which are modified structurally to have a "beat length" of less than 500 mm (high birefringence).

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6C994 Optical materials.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Low optical absorption materials, as follows:

a.1. Bulk fluoride compounds containing ingredients with a purity of 99.999% or better; or

NOTE: 6C994.a.1 controls fluorides of zirconium or aluminum and variants.

a.2. Bulk fluoride glass made from compounds controlled by 6C004.e.1;

b. ''Optical fiber preforms'' made from bulk fluoride compounds containing ingredients with a purity of 99.999% or better, specially designed for the manufacture of ''fluoride fibers'' controlled by 6A994.b.

D. SOFTWARE

6D001 "Software" specially designed for the "development" or "production" of equipment controlled by 6A004, 6A005, 6A008 or 6B008.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 6A004, 6A005, 6A008 or 6B008.	NS Column 1
MT applies to ''software'' for equipment controlled by 6A008 or 6B008 for MT reasons.	MT Column 1
NP applies to ''software'' for equipment controlled by 6A005 for NP reasons.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT and for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''software'' for items controlled by 6A008.l.3 or 6B008.

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6D991
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D002 "Software" specially designed for the "use" of equipment controlled by 6A002.b, 6A008 or 6B008.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for equipment controlled by 6A008 or 6B008 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 6D102 and 6D992
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D003 Other "software", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: Yes for 6D003.h.1

TSR: Yes, except for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''software'' for items controlled by 6D003.a.

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: See also 6D103 and 6D993

Related Definitions: N/A

Items: a. Acoustics ''software'', as follows:

a.1. ''Software'' specially designed for acoustic beam forming for the ''real time processing'' of acoustic data for passive reception using towed hydrophone arrays;

a.2. ''Source code'' for the ''real time processing'' of acoustic data for passive reception using towed hydrophone arrays;

a.3. ''Software'' specially designed for bottom or bay cable systems and having beamforming or ''source code'' for ''real time processing'' of acoustic data for passive reception;

b. Optical sensors. None.

c. Cameras. None.

d. Optics. None.

e. Lasers. None

f. Magnetometers.

f.1. ''Software'' specially designed for magnetic compensation systems for magnetic sensors designed to operate on mobile platforms;

f.2. ''Software'' specially designed for magnetic anomaly detection on mobile platforms;

g. Gravimeters. ''Software'' specially designed to correct motional influences of gravity meters or gravity gradiometers;

h. Radar ''software'', as follows:

h.1. Air Traffic Control ''software'' application ''programs'' hosted on general purpose computers located at Air Traffic Control centers and capable of any of the following:

h.1.a. Processing and displaying more than 150 simultaneous ''system tracks''; or

h.1.b. Accepting radar target data from more than four primary radars;

h.2. ''Software'' for the design or ''production'' of radomes which:

h.2.a. Are specially designed to protect the ''electronically steerable phased array antennae'' controlled by 6A008.e.; and

h.2.b. Result in an antenna pattern having an ''average side lobe level'' more than 40 dB below the peak of the main beam level.

TECHNICAL NOTE: ''Average side lobe level'' in 6D003.h.2.b is measured over the entire array excluding the angular extent of the main beam and the first two side lobes on either side of the main beam.

6D102 "Software" specially designed for the "use" of goods controlled by 6A108.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

6D103 "Software" that processes post-flight, recorded data, obtained from the systems controlled by 6A108.b, enabling determination of vehicle position throughout its flight path.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

The list of items controlled is contained in the ECCN heading.

6D104 "Software" specially designed for the "use" of equipment controlled by 6A002, 6A003, 6A007, 6A102, and 6B108, for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D991 "Software" specially designed for the "development", "production", or "use" of equipment controlled by 6A991, 6A996, 6A997, or 6A998.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry, except ''software'' for equipment controlled by 6A991.	AT Column 1
AT applies to ''software'' for equipment controlled by 6A991.	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D992 "Software" specially designed for the "development" or "production" of equipment controlled by 6A992, 6A994, or 6A995.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D993 Other "software" not controlled by 6D003.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Air Traffic Control (ATC) ''software'' application ''programs'' hosted on general purpose computers located at Air Traffic Control centers, and capable of automatically handing over primary radar target data (if not correlated with secondary surveillance radar (SSR) data) from the host ATC center to another ATC center;

E. TECHNOLOGY

6E001 "Technology" according to the General Technology Note for the "development" of equipment, materials or "software" controlled by 6A (except 6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or 6A998), 6B (except 6B995), 6C (except 6C992 or 6C994) or 6D (except 6D991, 6D992, or 6D993).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, RS, CC, AT, UN

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 6A001 to 6A008, 6B004 to 6B008, 6C002 to 6C005, or 6D001 to 6D003.	NS Column 1.
MT applies to ''technology'' for items controlled by 6A002, 6A007, 6A008, 6A102, 6A107, 6A108, 6B008, 6B108, 6D001, 6D002, 6D102 or 6D103 for MT reasons.	MT Column 1.
NP applies to ''technology'' for equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons.	NP Column 2.
RS applies to ''technology'' for equipment controlled by 6A002 or 6A003 for RS reasons.	RS Column 1.
CC applies to ''technology'' for equipment controlled by 6A002 for CC reasons.	CC Column 1.
AT applies to entire entry	AT Column 1.
UN applies to ''technology'' for equipment controlled by 6A002 or 6A003 for UN reasons..	Rwanda; Federal Republic of Yugoslavia reasons (Serbia and Montenegro).

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT and for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal,

Spain, Sweden, or the United Kingdom of ''technology'' for the ''development'' of equipment or ''software'' in 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.7, 6A001.a.2.b, 6A001.a.2.c and 6A001.a.2.e when specially designed for real time application, 6A002.a.1.c, 6A008.l.3, 6B008, 6D003.a, or 6D001 when specially designed for the ''development'' or ''production'' of equipment controlled by 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.7, 6A001.a.2.b, 6A001.a.2.c, and 6A001.a.2.e as set forth above.

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 6E101, 6E201, and 6E991
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E002 "Technology" according to the General Technology Note for the "production" of equipment or materials controlled by 6A (except 6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or 6A998), 6B (except 6B995), or 6C (except 6C992 or 6C994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, RS, AT, CC, UN

Control(s)	*Country Chart*
NS applies to ''technology'' for equipment controlled by 6A001 to 6A008, 6B004 to 6B008, or 6C002 to 6C005.	NS Column 1.
MT applies to ''technology'' for equipment controlled by 6A002, 6A007, 6A008, 6A102, 6A107, 6A108, 6B008, or 6B108 for MT reasons.	MT Column 1.
NP applies to ''technology'' for equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons.	NP Column 1.
RS applies to ''technology'' for equipment controlled by 6A002 or 6A003 for RS reasons.	RS Column 1.
CC applies to ''technology'' for equipment controlled by 6A002 for CC reasons.	CC Column 1.
AT applies to entire entry	AT Column 1.
UN applies to ''technology'' for equipment controlled by 6A002 or 6A003 for UN reasons.	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except N/A for MT and for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' for the ''development'' of equipment in 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.7, 6A001.a.2.b, 6A001.a.2.c and 6A001.a.2.e when specially designed for real time application, 6A002.a.1.c, 6A008.l.3, or 6B008.

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 6E992
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E003 Other "technology", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 6E993
Related Definitions: N/A
Items: a. Acoustics. None.

b. Optical sensors. None.

c. Cameras. None.

d. Optics, ''technology'', as follows:

d.1. Optical surface coating and treatment ''technology'' ''required'' to achieve uniformity of 99.5% or better for optical coatings 500 mm or more in diameter or major axis length and with a total loss (absorption and scatter) of less than 5×10^{-3};

N.B.: See also 2E003.f.

d.2. Optical fabrication ''technology'' using single point diamond turning techniques to produce surface finish accuracies of better than 10 nm rms on non-planar surfaces exceeding 0.5 m^2;

e. Lasers. ''Technology'' ''required'' for the ''development'', ''production'' or ''use'' of specially designed diagnostic instruments or targets in test facilities for ''SHPL'' testing or testing or evaluation of materials irradiated by ''SHPL'' beams;

f. Magnetometers. ''Technology'' ''required'' for the ''development'' or ''production'' of fluxgate ''magnetometers'' or fluxgate ''magnetometer'' systems, having any of the following:

f.1. A ''noise level'' of less than 0.05 nT rms per square root Hz at frequencies of less than 1 Hz; or

f.2. A ''noise level'' of less than $1 \times 10-3$ nT rms per square root Hz at frequencies of 1 Hz or more.

6E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" controlled by 6A002, 6A007.b and .c, 6A008, 6A102, 6A107, 6A108, 6B108, 6D102 or 6D103.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: (1) This entry only controls ''technology'' for equipment controlled by 6A008 when it is designed for airborne applications and is usable in ''missiles''. (2) This entry only controls ''technology'' for items in 6A002.a.1, a.3, and e that are specially designed or rated as electromagnetic (including ''laser'') and ionized-particle radiation resistant. (3) This entry only controls ''technology'' for items in 6A007.b and .c when the accuracies in 6A007.b.1 and b.2 are met or exceeded.
Items: The list of items controlled is contained in the ECCN heading.

6E102 "Technology" according to the General Technology Note for the "use" of "software" controlled by 6D001 and 6D002, for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E201 "Technology" according to the General Technology Note for the "use" of equipment controlled by 6A003.a.2, 6A003.a.3, 6A003.a.4, 6A005.a.1.c, 6A005.a.2.a, 6A005.c.1.b, 6A005.c.2.c.2, 6A005.c.2.d.2.b, 6A202, 6A203, 6A205, 6A225 or 6A226.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: This entry only controls ''technology'' for items in 6A005.a.2.a with an output power >40 W, 6A005.a.6 argon ''lasers'' only, 6A005.c.1.b with an output power >30 W, 6A005.c.2.c.2.a with an output power >40 W, 6A005.c.2.c.2.b with an output power >40 W, and 6A005.c.2.d.2.b with an output power >40 W.
Items: The list of items controlled is contained in the ECCN heading.

6E991 "Technology" for the "development", "production" or "use" equipment controlled by 6A991, 6A996, 6A997, or 6A998.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry except ''technology'' for equipment controlled by 6A991.	AT Column 1
AT applies to ''technology'' for equipment controlled by 6A991.	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E992 "Technology" for the "development" or "production" of equipment, materials or "software" controlled by 6A992, 6A994, or 6A995, 6B995, 6C992, 6C994, or 6D993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E993 Other "technology", not controlled by 6E003.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Optical fabrication technologies for serially producing optical components at a rate exceeding 10 m^2 of surface area per year on any single spindle and with:

a.1. An area exceeding 1 m^2; and

a.2. A surface figure exceeding lambda/10 rms at the designed wavelength;

b. ''Technology'' for optical filters with a bandwidth equal to or less than 10 nm, a field of view (FOV) exceeding 40° and a resolution exceeding 0.75 line pairs per milliradian;

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 7—Navigation and Avionics

A. SYSTEMS, EQUIPMENT AND COMPONENTS

N.B.: For automatic pilots for underwater vehicles, see Category 8. For radar, see Category 6.

NOTE TO CATEGORY 7A: For inertial navigation equipment for ships or submersibles see item 9.e on the Wassenaar Munitions List.

7A001 Accelerometers designed for use in inertial navigation or guidance systems and having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7A101 and 7A994. MT controls do not apply to accelerometers that are specially designed and developed as Measurement While Drilling (MWD) sensors for use in downhole well service applications.
Related Definitions: N/A
Items: a. A ''bias'' ''stability'' of less (better) than 130 micro g with respect to a fixed calibration value over a period of one year;

b. A ''scale factor'' ''stability'' of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year; *or*

c. Specified to function at linear acceleration levels exceeding 100 g.

7A002 Gyros having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7A102 and 7A994
Related Definitions: N/A
Items: a. A ''drift rate'' ''stability'', when measured in a 1 g environment over a period of three months and with respect to a fixed calibration value, of:

a.1. Less (better) than 0.1° per hour when specified to function at linear acceleration levels below 10 g; or

a.2. Less (better) than 0.5° per hour when specified to function at linear acceleration levels from 10 g to 100 g inclusive; or

b. Specified to function at linear acceleration levels exceeding 100 g.

7A003 Inertial navigation systems (gimballed or strapdown) and inertial equipment designed for "aircraft", land vehicle or "spacecraft" for attitude, guidance or control, having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7A103 and 7A994. Inertial navigation systems and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: a. Navigation error (free inertial) subsequent to normal alignment of 0.8 nautical mile per hour (50% Circular Error Probable (CEP)) or less (better); or

b. Specified to function at linear acceleration levels exceeding 10 g.

NOTE: The parameters of 7A003.a are applicable with any of the following environmental conditions:

1. Input random vibration with an overall magnitude of 7.7 g rms in the first half hour and a total test duration of one and one half hour per axis in each of the three perpendicular axes, when the random vibration meets the following:

a. A constant power spectral density (PSD) value of 0.04 g^2/Hz over a frequency interval of 15 to 1,000 Hz; and

b. The PSD attenuates with frequency from 0.04 g^2/Hz to 0.01 g^2/Hz over a frequency interval from 1,000 to 2,000 Hz; or

2. A roll and yaw rate of equal to or more than +2.62 radian/s (150 deg/s); or

3. According to national standards equivalent to 1. or 2. of this note.

NOTE: 7A003 does not control inertial navigation systems that are certified for use on ''civil aircraft'' by civil authorities of a ''participating state'' in Country Group A:1.

7A004 Gyro-astro compasses, and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites, with an azimuth accuracy of equal to or less (better) than 5 seconds of arc.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7A104 and 7A994
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7A005 Global navigation satellite systems (i.e. GPS or GLONASS) receiving equipment, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A006 Airborne altimeters operating at frequencies other than 4.2 to 4.4 GHz inclusive, having any of the following characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7A106, 7A994 and Category 6 for controls on radar.
Related Definitions: N/A
Items: a. ''Power management''; or

b. Using phase shift key modulation.

7A007 Direction finding equipment operating at frequencies above 30 MHz and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A101 Accelerometers, other than those controlled by 7A001, with a threshold of 0.05 g or less, or a linearity error within 0.25% of full scale output, or both, which are designed for use in inertial navigation systems or in guidance systems of all types and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: This entry does not control accelerometers which are specially designed and developed as MWD (Measurement While Drilling) sensors for use in downhole well service operations.
Related Definitions: N/A
Items: The list of items is included in the entry heading.

7A102 All types of gyros, other than those controlled by 7A002, usable in "missiles", with a rated "drift rate" "stability" of less than 0.5° (1 sigma or rms) per hour in a 1 g environment and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (1) Drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as an equivalent angular displacement per unit time with respect to inertial space. (2) Stability is defined as standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.
Items: The list of items controlled is contained in the ECCN heading.

7A103 Instrumentation, navigation equipment and systems, other than those controlled by 7A003, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) Items described in 7A103.b are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121). (2) Inertial navigation systems and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: a. Inertial or other equipment using accelerometers or gyros controlled by 7A001, 7A002, 7A101 or 7A102 and systems incorporating such equipment;

NOTE: 7A103.a does not control equipment containing accelerometers specially designed and developed as MWD (Measurement While Drilling) sensors for use in down-hole well services operations.

b. Integrated flight instrument systems, which include gyrostabilizers or automatic pilots, designed or modified for use in ''missiles''.

7A104 Gyro-astro compasses and other devices, other than those controlled by 7A004, which derive position or orientation by means of automatically tracking celestial bodies or satellites and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry controls specially designed components for gyro-astro compasses and other devices controlled by 7A004
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7A105 Global Positioning Systems (GPS) or similar satellite receivers, other than those controlled by 7A005, and designed or modified for use in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A106 Altimeters, other than those controlled by 7A006, of radar or laser radar type, designed or modified for use in "missiles". (These items are subject to the

export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A115 Passive sensors for determining bearing to specific electromagnetic source (direction finding equipment) or terrain characteristics, designed or modified for use in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A116 Flight control systems (hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire systems) and attitude control equipment) designed or modified for "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A117 "Guidance sets" capable of achieving system accuracy of 3.33% or less of the range (e.g., a "CEP" of 10 km or less at a range of 300 km). (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7A994 Other navigation direction finding equipment, airborne communication equipment, all aircraft inertial navigation systems not controlled under 7A003 or 7A103, and other avionic equipment, including parts and components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: (1) Global Positioning Satellite receivers having the following characteristics are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121): (a) Designed for encryption or decryption (e.g., Y-code) of GPS precise positioning service (PPS) signal; (b) Designed for producing navigation results above 60,000 feet altitude and at 1,000 knots velocity or greater; (c) Specifically designed or modified for use with a null-steering antenna or including a null-steering antenna designed to reduce or avoid jamming signals; or (d) Designed or modified for use with unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km. (GPS receivers designed or modified for use with military unmanned air vehicle systems with less capability are considered to be specially designed, modified or configured for military use are controlled by 22 CFR part 121. (2) This entry controls direction finding equipment that is not subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121).

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

7B001 Test, calibration or alignment equipment specially designed for equipment controlled by 7A (except 7A994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: (1) See also 7B102 and 7B994. (2) This entry does not control test, calibration or alignment equipment for Maintenance level I.

Related Definition: (1) Maintenance Level I: The failure of an inertial navigation unit is detected on the aircraft by indications from the Control and Display Unit (CDU) or by the status message from the corresponding sub-system. By following the manufacturer's manual, the cause of the failure may be localized at the level of the malfunctioning line replaceable unit (LRU). The operator then removes the LRU and replaces it with a spare. (2) Maintenance Level II: The defective LRU is sent to the maintenance workshop (the manufacturer's or that of the operator responsible for level II maintenance). At the maintenance workshop, the malfunctioning LRU is tested by various appropriate means to verify and localize the defective shop replaceable assembly (SRA) module responsible for the failure. This SRA is removed and replaced by an operative spare.

The defective SRA (or possibly the complete LRU) is then shipped to the manufacturer. Maintenance Level II does not include the removal of controlled accelerometers or gyro sensors from the SRA.

Items: The list of items controlled is contained in the ECCN heading.

7B002 Equipment, as follows (see List of Items Controlled), specially designed to characterize mirrors for ring "laser" gyros.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7B102 and 7B994
Related Definitions: N/A
Items: a. Scatterometers having a measurement accuracy of 10 ppm or less (better);

b. Profilometers having a measurement accuracy of 0.5 nm (5 angstrom) or less (better).

7B003 Equipment specially designed for the "production" of equipment controlled by 7A (except 7A994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 7B103 and 7B994. 2.) This entry includes: inertial measurement unit tester (IMU module); IMU platform tester; IMU stable element handling fixture; IMU platform balance fixture; gyro tuning test stations; gyro dynamic balance stations; gyro run-in/motor test stations; gyro evacuation and fill stations; centrifuge fixtures for gyro bearings; accelerometer axis align station; and accelerometer test station
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

7B102 Equipment, as follows (see List of Items Controlled), other than those controlled by 7B002, specially designed to characterize mirrors, for laser gyro equipment.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Scatterometers having a measurement accuracy of 10 ppm or less (better).

b. Reflectometers having a measurement accuracy of 50 ppm or less (better).

c. Prolifometers having a measurement accuracy of 0.5nm (5 angstrom) or less (better).

7B103 Specially designed "production facilities" for equipment controlled by 7A117. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7B994 Other equipment for the test, inspection, or "production" of navigation and avionics equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

C. MATERIALS [RESERVED]

D. SOFTWARE

7D001 "Software" specially designed or modified for the "development" or "production" of equipment controlled by 7A (except 7A994) or 7B (except 7B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 7A001 to 7A004, 7A006, 7B001, 7B002 or 7B003.	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to ''software'' for inertial navigation systems inertial equipment, and specially designed components therefor, for ''civil aircraft''	DRS Column 1.
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 7D101 and 7D994. (2) The ''software'' related to 7A003.b, 7A005, 7A007, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (3) ''Software'' for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

7D002 "Source code" for the "use" of any inertial navigation equipment or Attitude and Heading Reference Systems (AHRS) (except gimballed AHRS) including inertial equipment not controlled by 7A003 or 7A004.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 7D102 and 7D994. (2) This entry does not control ''source code'' for the ''use'' of gimballed AHRS
Related Definition: AHRS generally differ from inertial navigation systems (INS) in that an AHRS provides attitude and heading information and normally does not provide the acceleration, velocity and position information associated with an INS
Items: The list of items controlled is contained in the ECCN heading

7D003 Other "software", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 7D103 and 7D994
Related Definitions: N/A
Items: a. ''Software'' specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels controlled by 7A003 or 7A004;

b. ''Source code'' for hybrid integrated systems that improves the operational performance or reduces the navigational error of systems to the level controlled by 7A003 by continuously combining inertial data with any of the following navigation data:

b.1. Doppler radar velocity;

b.2. Global navigation satellite systems (i.e., GPS or GLONASS) reference data; or

b.3. Terrain data from data bases;

c. ''Source code'' for integrated avionics or mission systems that combine sensor data and employ ''expert systems'';

d. ''Source code'' for the ''development'' of any of the following:

d.1. Digital flight management systems for ''total control of flight'';

d.2. Integrated propulsion and flight control systems;

d.3. Fly-by-wire or fly-by-light control systems;

d.4. Fault-tolerant or self-reconfiguring ''active flight control systems'';

d.5. Airborne automatic direction finding equipment;

d.6. Air data systems based on surface static data; or

d.7. Raster-type head-up displays or three dimensional displays;

e. Computer-aided-design (CAD) ''software'' specially designed for the ''development'' of ''active flight control systems'', helicopter multi-axis fly-by-wire or fly-by-light controllers or helicopter ''circulation controlled anti-torque or circulation-controlled direction control systems'' whose ''technology'' is controlled by 7E004.b, 7E004.c.1 or 7E004.c.2.

7D101 "Software" specially designed for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A106, 7A115, 7B001, 7B002, 7B003, 7B102 or 7B103.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) The ''software'' related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) ''Software'' for inertial navigation systems and inertial equipment, and specially designed components therefor, not designed for use on civil aircraft by civil aviation authorities of a country listed in Country Group A:1 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

7D102 Integration "software" for the equipment controlled by 7A003 or 7A103.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: The ''software'' related to 7A003.b or 7A103.b are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

7D103 "Software" specially designed for modelling or simulation of the "guidance sets" controlled by 7A117 or for their design integration with "missiles". (This entry is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7D994 "Software", n.e.s., for the "development", "production", or "use" of navigation, airborne communication and other avionics.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

7E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" controlled by 7A (except 7A994), 7B (except 7B994) or 7D (except 7D994).

LICENSE REQUIREMENTS

Reason for Control: MT, NS, RS, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 7A001 to 7A004, 7A006, 7B001 to 7B003, 7D001 to 7D003.	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to ''technology'' for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft.	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: (1) See also 7E101 and 7E994. (2.) The ''technology'' related to 7A003.b, 7A005, 7A007, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Control (see 22 CFR part 121)
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

7E002 "Technology" according to the General Technology Note for the "production" of equipment controlled by 7A (except 7A994) or 7B (except 7B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for equipment controlled by 7A001 to 7A004, 7A006 or 7B001 to 7B003.	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to ''technology'' for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft.	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) See also 7E102 and 7E994. (2) The ''technology'' related to 7A003.b, 7A005, 7A007, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

7E003 "Technology" according to the General Technology Note for the repair, refurbishing or overhaul of equipment controlled by 7A001 to 7A004.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: See also 7E994. This entry does not control maintenance ''technology'' directly associated with calibration, removal or replacement of damaged or unserviceable LRUs and SRAs of a ''civil aircraft'' as described in Maintenance Level I or Maintenance Level II

Related Definition: Refer to the Related Definitions for 7B001

Items: The list of items controlled is contained in the ECCN heading

7E004 Other "technology", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: See also 7E104 and 7E994

Related Definitions: N/A

Items: a. ''Technology'' for the ''development'' or ''production'' of:

a.1. Airborne automatic direction finding equipment operating at frequencies exceeding 5 MHz;

a.2. Air data systems based on surface static data only, i.e., that dispense with conventional air data probes;

a.3. Raster-type head-up displays or three dimensional displays for ''aircraft'';

a.4. Inertial navigation systems or gyro-astro compasses containing accelerometers or gyros controlled by 7A001 or 7A002;

a.5. Electric actuators (i.e., electromechanical, electrohydrostatic and integrated actuator package) specially designed for ''primary flight control'';

a.6. ''Flight control optical sensor array'' specially designed for implementing ''active flight control systems'';

b. ''Development'' ''technology'', as follows, for ''active flight control systems'' (including fly-by-wire or fly-by-light):

b.1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve ''real time processing'' for control law implementation;

b.2. Control law compensation for sensor location or dynamic airframe loads, i.e., compensation for sensor vibration environment or for variation of sensor location from the center of gravity;

b.3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration;

NOTE: 7E004.b.3. does not control ''technology'' for the design of physical redundancy.

b.4. Flight controls that permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control;

b.5. Integration of digital flight control, navigation and propulsion control data into a digital flight management system for ''total control of flight'';

NOTE: 7E004.b.5 does not control:

1. ''Development'' ''technology'' for integration of digital flight control, navigation and propulsion control data into a digital flight management system for ''flight path optimization'';

2. ''Development'' ''technology'' for ''aircraft'' flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches.

b.6. Full authority digital flight control or multisensor mission management systems employing ''expert systems'';

N.B.: For ''technology'' for Full Authority Digital Engine Control (''FADEC''), see 9E003.a.9.

c. ''Technology'' for the ''development'' of helicopter systems, as follows:

c.1. Multi-axis fly-by-wire or fly-by-light controllers that combine the functions of at least two of the following into one controlling element:

c.1.a. Collective controls;

c.1.b. Cyclic controls;

c.1.c. Yaw controls;

c.2. ''Circulation-controlled anti-torque or circulation-controlled directional control systems'';

c.3. Rotor blades incorporating ''variable geometry airfoils'' for use in systems using individual blade control.

7E101 "Technology", other than "technology" controlled by 7E003, according to the General Technology Note for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A106, 7A115 to 7A117, 7B001, 7B002, 7B003, 7B102, 7B103, 7D101 to 7D103.

LICENSE REQUIREMENTS

Reason for Control: MT, RS, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
RS applies to ''use'' of inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft.	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: 1.) The ''technology'' related to 7A003.b, 7A005, 7A103.b, 7A105, 7A016, 7A115, 7A116, 7A117, 7B103, or 7D103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 2.) ''Technology'' for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

7E102 "Technology" for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards, from external sources, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: a. Design ''technology'' for shielding systems;

b. Design ''technology'' for the configuration of hardened electrical circuits and subsystems;

c. Design ''technology'' for the determination of hardening criteria of .a and .b of this entry.

7E104 "Technology" for the integration of the flight control, guidance, and propulsion data into a flight management system for optimization of rocket system trajectory. (This entry is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

7E994 "Technology", n.e.s., for the "development", "production", or "use" of navigation, airborne communication, and other avionics equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 8—Marine

A. SYSTEMS, EQUIPMENT AND COMPONENTS

8A001 Submersible vehicles and surface vessels, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000; N/A for 8A001.b and .d
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: For the control status of equipment for submersible vehicles, see: Category 5, Part 2 ''Information Security'' for encrypted communication equipment; Category 6 for sensors; Categories 7 and 8 for navigation equipment; Category 8A for underwater equipment.
Related Definitions: N/A
Items: a. Manned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m;

b. Manned, untethered submersible vehicles, having any of the following:

b.1. Designed to operate autonomously and having a lifting capacity of all the following:

b.1.a. 10% or more of their weight in air; *and*

b.1.b. 15 kN or more;

b.2. Designed to operate at depths exceeding 1,000 m; *or*

b.3. Having all of the following:

b.3.a. Designed to carry a crew of 4 or more;

b.3.b. Designed to operate autonomously for 10 hours or more;

b.3.c. Having a range of 25 nautical miles or more; *and*

b.3.d. Having a length of 21 m or less;

TECHNICAL NOTES: 1. For the purposes of 8A001.b, ''operate autonomously'' means fully submerged, without snorkel, all systems working and cruising at minimum speed at which the submersible can safely control its depth dynamically by using its depth planes only, with no need for a support vessel or support base on the surface, sea-bed or shore, and containing a propulsion system for submerged or surface use.

2. For the purposes of 8A001.b, ''range'' means half the maximum distance a submersible vehicle can cover.

c. Unmanned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m, having any of the following:

c.1. Designed for self-propelled manoeuvre using propulsion motors or thrusters controlled by 8A002.a.2; or

c.2. Having a fiber optic data link;

d. Unmanned, untethered submersible vehicles, having any of the following:

d.1. Designed for deciding a course relative to any geographical reference without real-time human assistance;

d.2. Having an acoustic data or command link; or

d.3. Having a fiber optic data or command link exceeding 1,000 m;

e. Ocean salvage systems with a lifting capacity exceeding 5 MN for salvaging objects from depths exceeding 250 m and having any of the following:

e.1. Dynamic positioning systems capable of position keeping within 20 m of a given point provided by the navigation system; or

e.2. Seafloor navigation and navigation integration systems for depths exceeding 1,000 m with positioning accuracies to within 10 m of a predetermined point;

f. Surface-effect vehicles (fully skirted variety) having all of the following characteristics:

f.1. A maximum design speed, fully loaded, exceeding 30 knots in a significant wave height of 1.25 m (Sea State 3) or more;

f.2. A cushion pressure exceeding 3,830 Pa; and

f.3. A light-ship-to-full-load displacement ratio of less than 0.70;

g. Surface-effect vehicles (rigid sidewalls) with a maximum design speed, fully loaded, exceeding 40 knots in a significant wave height of 3.25 m (Sea State 5) or more;

h. Hydrofoil vessels with active systems for automatically controlling foil systems, with a maximum design speed, fully loaded, of 40 knots or more in a significant wave height of 3.25 m (Sea State 5) or more;

i. Small waterplane area vessels having any of the following:

i.1. A full load displacement exceeding 500 tons with a maximum design speed, fully loaded, exceeding 35 knots in a significant wave height of 3.25 m (Sea State 5) or more; or

i.2. A full load displacement exceeding 1,500 tons with a maximum design speed, fully loaded, exceeding 25 knots in a significant wave height of 4 m (Sea State 6) or more.

TECHNICAL NOTE: A small waterplane area vessel is defined by the following formula: waterplane area at an operational design draught less than $2 \times (\text{displaced volume at the operational design draught})^{2/3}$.

8A002 Systems and equipment, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000; N/A for 8A002.o.3.b

GBS: Yes for 8A002.e.2 and manipulators for civil end-uses (e.g., underwater oil, gas or mining operations) controlled by 8A002.i.2 and having 5 degrees of freedom of movement

CIV: Yes for 8A002.e.2 and manipulators for civil end-uses (e.g., underwater oil, gas or mining operations) controlled by 8A002.i.2 and having 5 degrees of freedom of movement

LIST OF ITEMS CONTROLLED

Unit: Equipment in number

Related Controls: See also 8A992 and for underwater communications systems, see Category 5, Part I—Telecommunications.

Related Definitions: N/A

Items: a. Systems and equipment, specially designed or modified for submersible vehicles, designed to operate at depths exceeding 1,000 m, as follows:

a.1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;

a.2. Direct current propulsion motors or thrusters;

a.3. Umbilical cables, and connectors therefor, using optical fiber and having synthetic strength members;

b. Systems specially designed or modified for the automated control of the motion of equipment for submersible vehicles controlled by 8A001 using navigation data and having closed loop servo-controls:

b.1. Enabling a vehicle to move within 10 m of a predetermined point in the water column;

b.2. Maintaining the position of the vehicle within 10 m of a predetermined point in the water column; or

b.3. Maintaining the position of the vehicle within 10 m while following a cable on or under the seabed;

c. Fiber optic hull penetrators or connectors;

d. Underwater vision systems, as follows:

d.1. Television systems and television cameras, as follows:

d.1.a. Television systems (comprising camera, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 800 lines and specially designed or modified for remote operation with a submersible vehicle;

d.1.b. Underwater television cameras having a limiting resolution when measured in air of more than 1,100 lines;

d.1.c. Low light level television cameras specially designed or modified for underwater use containing all of the following:

d.1.c.1. Image intensifier tubes controlled by 6A002.a.2.a; and

d.1.c.2. More than 150,000 ''active pixels'' per solid state area array;

TECHNICAL NOTE: Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

d.2. Systems, specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimize the effects of back scatter, including range-gated illuminators or ''laser'' systems;

e. Photographic still cameras specially designed or modified for underwater use below 150 m having a film format of 35 mm or larger, and having any of the following:

e.1. Annotation of the film with data provided by a source external to the camera;

e.2. Automatic back focal distance correction; or

e.3. Automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;

f. Electronic imaging systems, specially designed or modified for underwater use, capable of storing digitally more than 50 exposed images;

g. Light systems, as follows, specially designed or modified for underwater use:

g.1. Stroboscopic light systems capable of a light output energy of more than 300 J per flash and a flash rate of more than 5 flashes per second;

g.2. Argon arc light systems specially designed for use below 1,000 m;

h. ''Robots'' specially designed for underwater use, controlled by using a dedicated ''stored program controlled'' computer, having any of the following:

h.1. Systems that control the ''robot'' using information from sensors which measure force or torque applied to an external object, distance to an external object, or tactile sense between the ''robot'' and an external object; or

h.2. The ability to exert a force of 250 N or more or a torque of 250 Nm or more and using titanium based alloys or ''fibrous or filamentary'' ''composite'' materials in their structural members;

i. Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles, having any of the following:

i.1. Systems which control the manipulator using the information from sensors which

measure the torque or force applied to an external object, or tactile sense between the manipulator and an external object; or

i.2. Controlled by proportional master-slave techniques or by using a dedicated ''stored program controlled'' computer, and having 5 degrees of freedom of movement or more;

NOTE: Only functions having proportional control using positional feedback or by using a dedicated ''stored program controlled'' computer are counted when determining the number of degrees of freedom of movement.

j. Air independent power systems, specially designed for underwater use, as follows:

j.1. Brayton or Rankine cycle engine air independent power systems having any of the following:

j.1.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

j.1.b. Systems specially designed to use a monoatomic gas;

j.1.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; or

j.1.d. Systems specially designed:

j.1.d.1. To pressurize the products of reaction or for fuel reformation;

j.1.d.2. To store the products of the reaction; and

j.1.d.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

j.2. Diesel cycle engine air independent systems, having all of the following:

j.2.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

j.2.b. Systems specially designed to use a monoatomic gas;

j.2.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; and

j.2.d. Specially designed exhaust systems that do not exhaust continuously the products of combustion;

j.3. Fuel cell air independent power systems with an output exceeding 2 kW having any of the following:

j.3.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; or

j.3.b. Systems specially designed:

j.3.b.1. To pressurize the products of reaction or for fuel reformation;

j.3.b.2. To store the products of the reaction; and

j.3.b.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

j.4. Stirling cycle engine air independent power systems, having all of the following:

j.4.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; and

j.4.b. Specially designed exhaust systems which discharge the products of combustion against a pressure of 100 kPa or more;

k. Skirts, seals and fingers, having any of the following:

k.1. Designed for cushion pressures of 3,830 Pa or more, operating in a significant wave height of 1.25 m (Sea State 3) or more and specially designed for surface effect vehicles (fully skirted variety) controlled by 8A001.f; or

k.2. Designed for cushion pressures of 6,224 Pa or more, operating in a significant wave height of 3.25 m (Sea State 5) or more and specially designed for surface effect vehicles (rigid sidewalls) controlled by 8A001.g;

l. Lift fans rated at more than 400 kW specially designed for surface effect vehicles controlled by 8A001.f or 8A001.g;

m. Fully submerged subcavitating or supercavitating hydrofoils specially designed for vessels controlled by 8A001.h;

n. Active systems specially designed or modified to control automatically the sea-induced motion of vehicles or vessels controlled by 8A001.f, 8A001.g, 8A001.h or 8A001.i;

o. Propellers, power transmission systems, power generation systems and noise reduction systems, as follows:

o.1. Water-screw propeller or power transmission systems, as follows, specially designed for surface effect vehicles (fully skirted or rigid sidewall variety), hydrofoils or small waterplane area vessels controlled by 8A001.f, 8A001.g, .8A001.h or 8A001.i:

o.1.a. Supercavitating, super-ventilated, partially-submerged or surface piercing propellers rated at more than 7.5 MW;

o.1.b. Contrarotating propeller systems rated at more than 15 MW;

o.1.c. Systems employing pre-swirl or post-swirl techniques for smoothing the flow into a propeller;

o.1.d. Light-weight, high capacity (K factor exceeding 300) reduction gearing;

o.1.e. Power transmission shaft systems, incorporating ''composite'' material components, capable of transmitting more than 1 MW;

o.2. Water-screw propeller, power generation systems or transmission systems designed for use on vessels, as follows:

o.2.a. Controllable-pitch propellers and hub assemblies rated at more than 30 MW;

o.2.b. Internally liquid-cooled electric propulsion engines with a power output exceeding 2.5 MW;

o.2.c. ''Superconductive'' propulsion engines, or permanent magnet electric propulsion engines, with a power output exceeding 0.1 MW;

o.2.d. Power transmission shaft systems, incorporating ''composite'' material components, capable of transmitting more than 2 MW;

o.2.e. Ventilated or base-ventilated propeller systems rated at more than 2.5 MW;

o.3. Noise reduction systems designed for use on vessels of 1,000 tons displacement or more, as follows:

o.3.a. Systems that attenuate underwater noise at frequencies below 500 Hz and consist of compound acoustic mounts for the acoustic isolation of diesel engines, diesel generator sets, gas turbines, gas turbine generator sets, propulsion motors or propulsion reduction gears, specially designed for sound or vibration isolation, having an intermediate mass exceeding 30% of the equipment to be mounted;

o.3.b. Active noise reduction or cancellation systems, or magnetic bearings, specially designed for power transmission systems, and incorporating electronic control systems capable of actively reducing equipment vibration by the generation of anti-noise or anti-vibration signals directly to the source;

p. Pumpjet propulsion systems having a power output exceeding 2.5 MW using divergent nozzle and flow conditioning vane techniques to improve propulsive efficiency or reduce propulsion-generated underwater-radiated noise;

8A018 Items on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $5000, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Closed and semi-closed circuit (rebreathing) apparatus for diving and underwater swimming, and specially designed components for use in the conversion of open-circuit apparatus to military use;

b. Naval equipment, as follows:

b.1. Diesel engines of 1,500 hp and over with rotary speed of 700 rpm or over specially designed for submarines;

b.2. Electric motors specially designed for submarines, i.e., over 1,000 hp, quick reversing type, liquid cooled, and totally enclosed;

b.3. Nonmagnetic diesel engines, 50 hp and over, specially designed for military purposes. (An engine shall be presumed to be specially designed for military purposes if it has nonmagnetic parts other than crankcase, block, head, pistons, covers, end plates, valve facings, gaskets, and fuel, lubrication and other supply lines, or its nonmagnetic content exceeds 75 percent of total weight.);

b.4. Marine boilers designed to have any of the following characteristics:

b.4.a. Heat release rate (at maximum rating) equal to or in excess of 190,000 BTU per hour per cubic foot of furnace volume; or

b.4.b. Ratio of steam generated in pounds per hour (at maximum rating) to the dry weight of the boiler in pounds equal to or in excess of 0.83;

b.5. Submarine and torpedo nets; and

b.6. Components, parts, accessories, and attachments for the above.

8A992 Underwater systems or equipment, not controlled by 8A002, and specially designed parts therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Underwater vision systems, as follows:

a.1. Television systems (comprising camera, lights, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 500 lines and specially designed or modified for remote operation with a submersible vehicle; or

a.2. Underwater television cameras having a limiting resolution when measured in air of more than 700 lines;

TECHNICAL NOTE: Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

b. Photographic still cameras specially designed or modified for underwater use, having a film formate of 35 mm or larger, and having autofocussing or remote focussing specially designed for underwater use;

c. Stroboscopic light systems, specially designed or modified for underwater use, capable of a light output energy of more than 300 J per flash;

d. Other underwater camera equipment, n.e.s.;

e. Other submersible systems, n.e.s.;

f. Boats, n.e.s., including inflatable boats, and specially designed components therefor, n.e.s.;

g. Marine engines (both inboard and outboard) and submarine engines, n.e.s; and specially designed parts therefor, n.e.s.;

h. Other self-contained underwater breathing apparatus (scuba gear) and related equipment, n.e.s.;

i. Pressure regulators, air cylinders, hoses, valves and backpacks for the apparatus described in paragraph 8A002.q;

j. Life jackets, inflation cartridges, compasses, wetsuits, masks, fins, weight belts, and dive computers;

k. Underwater lights and propulsion equipment;

l. Air compressors and filtration systems specially designed for filling air cylinders.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

8B001 Water tunnels, having a background noise of less than 100 dB (reference 1 μPa, 1 Hz) in the frequency range from 0 to 500 Hz, designed for measuring acoustic fields generated by a hydro-flow around propulsion system models.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

C. MATERIALS

8C001 Syntactic foam designed for underwater use, having all of the following (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: Syntactic foam consists of hollow spheres of plastic or glass embedded in a resin matrix
Items: a. Designed for marine depths exceeding 1,000 m; *and*

b. A density less than 561 kg/m^3.

D. SOFTWARE

8D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment or materials controlled by 8A (except 8A018 or 8A992), 8B or 8C.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''software'' specially designed for the ''development'' or ''production'' of equipment controlled by 8A001.b, 8A001.d, or 8A002.o.3.b

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

8D002 Specific "software" specially designed or modified for the "development", "production", repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 8D992
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

8D992 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 8A992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

E. TECHNOLOGY

8E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials controlled by 8A (except 8A018 or 8A992), 8B or 8C.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' for items controlled by 8A001.b, 8A001.d, or 8A002.o.3.b
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

8E002 Other "technology", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: See also 8E992
Related Definitions: N/A
Items: a. ''Technology'' for the ''development'', ''production'', repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction;

b. ''Technology'' for the overhaul or refurbishing of equipment controlled by 8A001, 8A002.b, 8A002.j, 8A002.o or 8A002.p.

8E992 "Technology" for the "development", "production" or "use" of equipment controlled by 8A992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading'

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 9—Propulsion Systems, Space Vehicles and Related Equipment

A. SYSTEMS, EQUIPMENT AND COMPONENTS

(For propulsion systems designed or rated against neutron or transient ionizing radiation, see the U.S. Munitions List, 22 CFR part 121.)

9A001 Aero gas turbine engines incorporating any of the "technologies" controlled by 9E003.a, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to only to those engines that meet the characteristics listed in 9A101.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 9A101 and 9A991
Related Definitions: N/A
Items: a. Not certified for the specific ''civil aircraft'' for which they are intended;

NOTE: For the purpose of the ''civil aircraft'' certification process, a number of up to 16 civil certified engines, assemblies, or components including spares is considered appropriate.

b. Not certified for civil use by the aviation authorities in Country Group A:1;

c. Designed to cruise at speeds exceeding Mach 1.2 for more than thirty minutes.

9A002 Marine gas turbine engines with an ISO standard continuous power rating of 24,245 kW or more and a specific fuel consumption not exceeding 0.219 kg/kWh in the power range from 35 to 100%, and specially designed assemblies and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definition: The term ''marine gas turbine engines'' includes those industrial, or aero-derivative, gas turbine engines adapted for a ship's electric power generation or propulsion
Items: The list of items controlled is contained in the ECCN heading

9A003 Specially designed assemblies and components, incorporating any of the "technologies" controlled by 9E003.a, for gas turbine engine propulsion systems, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definition: N/A
Items: a. Controlled by 9A001;

b. Whose design or production origins are either countries in Country Group D:1 or unknown to the manufacturer.

9A004 Space launch vehicles and "spacecraft".

LICENSE REQUIREMENTS

Reason for Control: NS, SI, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
SI applies to commercial communications satellites controlled by 9A004 that include the individual munitions list systems, components, or parts identified on the United States Munitions List (USML). 22 CFR part 121. See §742.14 of the EAR for additional information.	
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; components, parts and accessories in $ value
Related Controls: (1) See also 9A104 (2) This entry describes space launch vehicles (not including their payloads) and other ''spacecraft''. (3) Commercial communications satellites are subject to Commerce licensing jurisdiction even if they include the individual munitions list systems, components, or parts identified on the United States Munitions List (USML). In all other

cases, these systems, components, or parts remain on the USML, except that satellite fuel, ground support equipment, test equipment, payload adapter/interface hardware, replacement parts for the preceding items, and non-embedded, solid propellant orbit transfer orbit transfer engines (''kick motors'') are subject to Commerce licensing jurisdiction (and not controlled on the USML) when they are to be utilized for the specific commercial communications satellite launch, provided the solid propellant ''kick motor'' being utilized is not specifically designed or modified for military use or capable of being restarted after achievement of mission orbit (such orbit transfer engines are always controlled on USML). Technical data (as defined in 120.10 of the International Traffic in Arms Regulations (ITAR)) and defense services (as defined in 120.9 of the ITAR) related to the systems, components, or parts on the USML are always controlled under the USML, even when the satellite itself is licensed by the Department of Commerce. (4) Military communications satellites or multi-mission satellites, including commercial communications satellites having additional non-communication mission(s) or payload(s) are under the jurisdiction of the Department of State. (5) Other ''spacecraft'' not subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls under 22 CFR part 121. This entry includes the international space station being developed, launched and operated under the supervision of the U.S. National Aeronautics and Space Administration. Exporters requesting a license from the Department of Commerce for spacecraft other than the international space station or a commercial communications satellite specified in 9A004 must provide a statement from the Department of State, Office of Defense Trade Controls, verifying that the item intended for export is under the licensing jurisdiction of the Department of Commerce. (6) All other spacecraft, including all other satellites not controlled under 9A004 and components, parts, accessories, attachments, associated equipment, and ground support equipment therefor are subject to the export licensing authority of the Department of State. (7) Items on the USML that are included in a commercial communications satellite to be exported under a Commerce license must be specifically listed on the Commerce license application. Such items when not included in a specific commercial communications satellite are under the jurisdiction of the Department of State. (8) Technical data provided to the launch provider (form, fit, function, mass, electrical, mechanical, dynamic/environmental, telemetry, safety, facility, launch pad access, and launch parameters) for commercial communications satellites that describe the interfaces for mating of the satellite to the launch vehicle and parameters for launch (e.g. orbit, timing) of the satellite, are under Commerce jurisdiction. Other technical data and all defense services and technical assistance for satellite and/or launch vehicles, including compatibility, integration, or processing data are controlled and subject to licensing by the Department of State, in accordance with 22 CFR parts 120 through 130. Approval for such technical assistance will require a Technical Assistance Agreement (TAA) and may require U.S. Government oversight. (9) Once a satellite is launched, items remaining unlaunched are required to be returned immediately to the United States. If the satellite launch is canceled or unduly delayed, the satellite and all support equipment must be returned immediately to the United States. (10) Detailed design, development, production, or manufacturing data for all spacecraft, including satellites, regardless of which agency has jurisdiction over the export, and all systems components, parts, accessories, attachments, and associated equipment (including ground support equipment) specifically designed or modified for articles on the USML (including software source code and operating algorithms) are subject to licensing by the Department of State. This does not include that level of technical data (including marketing data) necessary and reasonable for a purchaser to have assurance that a U.S.-built item intended to operate in space has been designed, manufactured and tested in conformance with specified contract requirements (e.g., operational performance, reliability, lifetime, product quality, or delivery expectations) as well as data necessary for normal in-orbit satellite operations, to evaluate in-orbit anomalies, and to operate and maintain associated ground station equipment (except encryption hardware). (11) For the control status of products contained in ''spacecraft'' payloads, see the appropriate categories

Related Definitions: Transferring registration or operational control to any foreign person of any commercial communications satellite controlled by this entry must be authorized on a license issued by the Bureau of Export Administration. This requirement applies whether the commercial communications satellite is physically located in the United States or abroad

Items: The list of items controlled is contained in the ECCN heading

9A005 Liquid rocket propulsion systems containing any of the systems or components controlled by 9A006. (These items

are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A006 Systems and components specially designed for liquid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A007 Solid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A008 Components specially designed for solid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A009 Hybrid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A010 Specially designed components, systems and structures for launch vehicles, launch vehicle propulsion systems or "spacecraft". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A011 Ramjet, scramjet or combined cycle engines and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and b	RS Column 2
AT applies to entire entry	AT Column 1
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: (a) Parachute systems designed for use in dropping military equipment, braking military aircraft, slowing spacecraft descent, or retarding weapons delivery; AND (b) Instrument flight trainers for combat simulation are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)

Related Definition: This entry controls parachute systems designed for use in dropping personnel only.

Items: a. Military trainer aircraft bearing ''T'' designations:

a.1. Using reciprocating engines; or

a.2. Turbo prop engines with less than 600 horse power (h.p.);

a.3. T–37 model jet trainer aircraft; and

a.4. Specially designed component parts.

b. Vehicles specially designed or modified for military purposes. (See §770, Interpretation 8)

c. Pressure refuelers, pressure refueling equipment, and equipment specially designed to facilitate operations in confined areas; and ground equipment, n.e.s, developed specially for military aircraft and helicopters, and specially designed parts and accessories, n.e.s.;

d. Pressurized breathing equipment specially designed for use in military aircraft and helicopters;

e. Military parachutes and complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use;

f. Military instrument flight trainers, except for combat simulation; and components, parts, attachments and accessories specially designed for such equipment.

9A018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
RS applies to 9A018.a and b	RS Column 2.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: $1500, except N/A for Rwanda and for the Federal Republic of Yugoslavia (Serbia and Montenegro)
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: (1) This entry controls parachute systems designed for use in dropping personnel only. (2) Parachute systems designed for use in dropping military equipment, braking military aircraft, slowing spacecraft descent, or retarding weapons delivery; AND Instrument flight trainers for combat simulation are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: N/A

Items: a. Military trainer aircraft bearing ''T'' designations:

a.1. Using reciprocating engines; *or*

a.2. Turbo prop engines with less than 600 horse power (h.p.);

a.3. T–37 model jet trainer aircraft; and

a.4. Specially designed component parts.

b. Ground vehicles and components therefor, specially designed or modified for military purposes. (See part 770 of the EAR, Interpretation 8)

c. Pressurized breathing equipment specially designed for use in military aircraft and helicopters;

d. Military parachutes;

e. Military instrument flight trainers, except for combat simulation; and components, parts, attachments and accessories specially designed for such equipment.

9A101 Lightweight turbojet and turbofan engines (including turbocompound engines) usable in "missiles", other than those controlled by 9A001, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: (1) Items controlled in 9A101.b are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121). (2) Engines designed or modified for missiles (except engines for non-military unmanned air vehicles [UAVs] or remotely piloted vehicles [RPVs]), regardless of thrust or specific fuel consumption, are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: N/A

Items: a. Engines having both of the following characteristics:

a.1. Maximum thrust value greater than 1000 N (achieved un-installed) excluding civil certified engines with a maximum thrust value greater than 8,890 N (achieved un-installed), and

a.2. Specific fuel consumption of 0.13 kg/N/hr or less (at sea level static and standard conditions); or

b. Engines designed or modified for use in ''missiles''.

9A104 Sounding rockets, capable of a range of at least 300 km. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A105 Liquid propellant rocket engines. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A106 Liquid rocket propulsion systems or components, other than those controlled by 9A006, usable in rockets with a range capability of 30 Km or greater, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment and components in number; parts and accessories in $ value

Related Controls: Items described in 9A106.a, .b, and .c are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121)

Related Definitions: N/A

Items: a. Ablative liners for thrust or combustion chambers;

b. Rocket nozzles;

c. Thrust vector control sub-systems;

TECHNICAL NOTE: Examples of methods of achieving thrust vector control controlled by 9A106.c includes:

1. Flexible nozzle;

2. Fluid or secondary gas injection;

3. Movable engine or nozzle;

4. Deflection of exhaust gas steam (jet vanes or probes); *or*

5. Thrust tabs.

d. Liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments of more than 10 g rms between 20 Hz and 2000 Hz.

NOTE: The only servo valves and pumps controlled by 9A106.d, are the following:

a. Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7 Mpa or greater, that have an actuator response time of less than 100 ms;

b. Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 rpm or with discharge pressures equal to or greater than 7 Mpa.

9A107 Solid propellant rocket engines, usable in rockets with a range capability of 300 Km or greater, other than those controlled by 9A007, having total impulse capacity of 0.841 Mns or greater. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A108 Solid rocket propulsion components, other than those controlled by 9A008, usable in rockets with a range capability of 300 Km or greater. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A109 Hybrid rocket motors, usable in rockets with a range capability of 300 Km or greater, other than those controlled by 9A009, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A110 Composite structures, laminates and manufactures thereof, other than those controlled by entry 9A010, specially designed for use in "missiles" or the subsystems controlled by entries 9A005, 9A007, 9A105.a, 9A106 to 9A108, 9A116 or 9A119, and resin impregnated fiber prepregs and metal coated fiber preforms therefor, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements having a specific tensile strength greater than 7.62×10^4 m and a specific modulus greater than 3.18×10^6 m.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms

Related Controls: (1) See also 1A002, 1C010, and 1C210. (2) The only resin impregnated fiber prepregs controlled by entry 9A110 are those using resins with a glass transition temperature (T_g), after cure, exceeding 418 K (145° C) as determined by ASTM D4065 or equivalents. (3) ''Composite structures, laminates, and manufactures thereof, specially designed for use in missile systems are under the licensing authority of the Office of Defense Trade Controls, U.S. Department of State, except those specially designed for non-military unmanned air vehicles controlled in 9A120

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

9A111 Pulse jet engines, usable in "missiles", and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A115 Launch support equipment, designed or modified for "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A116 Reentry vehicles, usable in "missiles", and equipment designed or modified therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A117 Staging mechanisms, separation mechanisms, and interstages, usable in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A118 Devices to regulate combustion usable in engines which are usable in rockets with a range capability greater than 300 Km or greater, controlled by 9A011 or

9A111. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A119 Individual rocket stages, usable in rockets with a range capability greater than 300 Km or greater, other than those controlled by 9A005, 9A007, 9A009, 9A105, 9A107 and 9A109. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9A120 Non-military unmanned air vehicle systems (UAVs) and remotely piloted vehicles (RPVs) that are capable of a maximum range of at least 300 kilometers (km), regardless of payload.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9A980 Nonmilitary mobile crime science laboratories; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9A990 Diesel engines, n.e.s., and tractors and specially designed parts therefor, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry except 9A990.a.	AT Column 1
AT applies to 9A990.a only	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Diesel engines, n.e.s., for trucks, tractors, and automotive applications of continuous brake horsepower of 400 BHP (298 kW) or greater (performance based on SAE J1349 standard conditions of 100 Kpa and 25°)

b. Off highway wheel tractors of carriage capacity 9 mt (20,000 lbs) or more; and parts and accessories, n.e.s.

c. On-Highway tractors, with single or tandem rear axles rated for 9 mt per axel (20,000 lbs.) or greater and specially designed parts.

9A991 "Aircraft", n.e.s., and gas turbine engines not controlled by 9A001 or 9A101 and parts and components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT, UN

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1.
UN applies to 9A991.a	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Military aircraft, demilitarized (not specifically equipped or modified for military operation), as follows:

a.1. Cargo, ''C–45 through C–118'' inclusive, and ''C–121,''

a.2. Trainers, bearing a ''T'' designation and using piston engines,

a.3. Utility, bearing a ''U'' designation and using piston engines,

a.4. Liaison, bearing an ''L'' designation, and

a.5. Observation, bearing an ''O'' designation and using piston engines;

b. Civil aircraft; *and*

NOTE: Specify make and model of aircraft and type of avionic equipment on aircraft.

c. Aero gas turbine engines, and specially designed parts therefor.

NOTE: 9A991.c does not control aero gas turbine engines that are destined for use in civil ''aircraft'' and that have been in use in bona fide civil ''aircraft'' for more than eight years.

d. Aircraft parts and components, n.e.s.

e. Pressurized aircraft breathing equipment, n.e.s.; and specially designed parts therefor, n.e.s.

9A992 Complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

9B001 Specially designed equipment, tooling and fixtures, as follows (see List of Items Controlled), for manufacturing or measuring gas turbine blades, vanes or tip shroud castings.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies only to equipment for engines that meet the characteristics described in 9A001.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

LVS: $5000, except N/A for MT
GBS: Yes, except N/A for MT
CIV: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: For specially designed production equipment of systems, sub-systems and components controlled by 9A005 to 9A009, 9A011, 9A101, 9A105 to 9A109, 9A111, and 9A116 to 9A119 usable in ''missiles'' see 9B115. See also 9B991
Related Definitions: N/A
Items: a. Directional solidification or single crystal casting equipment;

b. Ceramic cores or shells;

c. Ceramic core manufacturing equipment or tools;

d. Ceramic shell wax pattern preparation equipment.

9B002 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for the "development" of gas turbine engines, assemblies or components incorporating "technologies" controlled by 9E003.a.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies only to equipment for engines that meet the characteristics described in 9A001.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000, except N/A for MT
GBS: Yes, except N/A for MT
CIV: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B003 Equipment specially designed for the "production" or test of gas turbine brush seals designed to operate at tip speeds exceeding 335 m/s, and temperatures in excess of 773 K (500°C), and specially designed components or accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies only to equipment for engines that meet the characteristics described in 9A001.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000, except N/A for MT
GBS: Yes, except N/A for MT
CIV: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: See also 9B115
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B004 Tools, dies or fixtures for the solid state joining of "superalloy", titanium or intermetallic airfoil-to-disk combinations described in 9E003.a.3 or 9E003.a.6 for gas turbines.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies only to equipment for engines that meet the characteristics described in 9A001.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000, except N/A for MT
GBS: Yes, except N/A for MT
CIV: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B005 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for use with any of the following wind tunnels or devices (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 9B105
Related Definitions: N/A
Items: a. Wind tunnels designed for speeds of Mach 1.2 or more, except those specially designed for educational purposes and having a test section size (measured laterally) of less than 250 mm;

TECHNICAL NOTE: Test section size in 9B005.a means the diameter of the circle, or the side of the square, or the longest side of the rectangle, at the largest test section location.

b. Devices for simulating flow-environments at speeds exceeding Mach 5, including hot-shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns; *or*

c. Wind tunnels or devices, other than two-dimensional sections, capable of simulating Reynolds number flows exceeding 25×10^6.

9B006 Acoustic vibration test equipment capable of producing sound pressure levels of 160 Db or more (referenced to 20 uPa) with a rated output of 4 kW or more at a test cell temperature exceeding 1,273 K (1,000 °C), and specially designed quartz heaters therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: See also 9B106. Note that some items in 9B006 may also be controlled under 9B106
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B007 Equipment specially designed for inspecting the integrity of rocket motors using non-destructive test (NDT) techniques other than planar X-ray or basic physical or chemical analysis.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GSB N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B008 Transducers specially designed for the direct measurement of the wall skin friction of the test flow with a stagnation temperature exceeding 833 K (560 °C).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GSB N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B009 Tooling specially designed for producing turbine engine powder metallurgy rotor components capable of operating at stress levels of 60% of ultimate tensile strength (UTS) or more and metal temperatures of 873 K (600 °C) or more.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B105 Wind tunnels for speeds of Mach 0.9 or more, usable for "missiles" and their subsystems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS
LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 9B005
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B106 Environmental chambers and anechoic chambers, as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Environmental chambers capable of simulating the following flight conditions:

a.1. Altitudes of 15,000 m *or* greater; or

a.2. Temperature of at least 223 K (−50° C) to 398 K (+ 125° C) and vibration environments of 10 g rms or greater between 20 Hz and 2,000 Hz and imparting forces of 5 Kn or greater.

b. Anechoic chambers capable of simulating the following flight conditions:

b.1. Altitudes of 15,000 m or greater; *or*

b.2. Temperature of at least 223 K (50° C) to 398 K (+ 125° C) and acoustic environments at an overall sound pressure level of 140 Db or greater (referenced to 20 microPa) or with a rated power output of 4 kW or greater.

9B115 Specially designed "production equipment" for the systems, sub-systems and components controlled by 9A005 to 9A009, 9A011, 9A101, 9A105 to 9A109, 9A111, 9A116 to 9A119. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9B116 Specially designed "production facilities" for the systems, sub-systems, and components controlled by 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9B117 Test benches and test stands for solid or liquid propellant rockets or rocket motors, having either of the following characteristics (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See also 9B990
Related Definitions: N/A
Items: a. The capacity to handle more than 90 Kn of thrust; *or*

b. Capable of simultaneously measuring the three axial thrust components.

9B990 Vibration test equipment and specially designed parts and components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9B991 Specially designed equipment, tooling or fixtures, not controlled by 9B001, as described in the List of Items Controlled, for manufacturing or measuring gas turbine blades, vanes or tip shroud castings.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Automated equipment using non-mechanical methods for measuring airfoil wall thickness;

b. Tooling, fixtures or measuring equipment for the ''laser'', water jet or ECM/EDM hole drilling processes controlled by 9E003.c;

c. Ceramic core leaching equipment;

d. Ceramic shell burn out or firing equipment.

C. MATERIALS [RESERVED]

D. SOFTWARE

9D001 "Software" required for the "development" of equipment or "technology" controlled by 9A (except 9A018, 9A990 or 9A991), 9B (except 9B990 or 9B991) or 9E003.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''software'' for items controlled by 9A001 to 9A003, 9B001 to 9B009, 9E003.	NS Column 1
MT applies to ''software'' for equipment controlled by 9A001, 9A101, 9A106, 9A110, 9A120, 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B105, 9B106, 9B116, and 9B117 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 9D101. (2) ''Software'' ''required'' for the ''development'' of items controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (3) ''Software'' ''required'' for the ''development'' of equipment or ''technology'' subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9D002 "Software" required for the "production" of equipment controlled by 9A (except 9A018, 9A990 or 9A991) or 9B (except 9B990 or 9B991).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 9A001 to 9A003 or 9B001 to 9B009.	NS Column 1

Control(s)	*Country Chart*
MT applies to ''software'' for equipment controlled by 9A001, 9A101, 9A106, 9A110, 9A120, 9B001, 9B002, 9B003, 9B004, 9B005, 9B007 9B105, 9B106, 9B116, and 9B117 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) ''Software'' ''required'' for the ''production'' of items controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) ''Software'' ''required'' for the ''production'' of equipment or ''technology'' subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9D003 "Software" required for the "use" of full authority digital electronic engine controls (FADEC) for propulsion systems controlled by 9A (except 9A018, 9A990 or 9A991) or equipment controlled by 9B (except 9B990 or 9B991), as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''software'' for ''use'' of FADEC for equipment controlled by 9A001 to 9A003.	NS Column 1
MT applies to ''software'' required for the ''use'' of FADEC for gas turbine engines controlled by 9A101, 9A106, or 9A110.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: Yes, except N/A for MT
TSR: Yes, except N/A for MT

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) See also 9D103. (2) ''Software'' ''required'' for the ''use'' of items controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (3) ''Software'' ''required'' for the ''use'' of equipment or ''technology'' subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)
Related Definitions: N/A
Items: a. ''Software'' in digital electronic controls for propulsion systems, aerospace test facilities or air breathing aero-engine test facilities;

b. Fault-tolerant ''software'' used in ''FADEC'' systems for propulsion systems and associated test facilities.

9D004 Other "software", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. 2D or 3D viscous ''software'' validated with wind tunnel or flight test data required for detailed engine flow modelling;

b. ''Software'' for testing aero gas turbine engines, assemblies or components, specially designed to collect, reduce and analyze data in real time, and capable of feedback control, including the dynamic adjustment of test articles or test conditions, as the test is in progress;

c. ''Software'' specially designed to control directional solidification or single crystal casting;

d. ''Software'' in ''source code'', ''object code'' or machine code required for the ''use'' of active compensating systems for rotor blade tip clearance control.

NOTE: 9D004.d does not control ''software'' embedded in uncontrolled equipment or required for maintenance activities associated with the calibration or repair or updates to the active compensating clearance control system.

9D018 "Software" for the "use" of equipment controlled by 9A018.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.

Control(s)	*Country Chart*
RS applies to 9A018.a and .b	RS Column 2.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes for Australia, Japan, New Zealand, and NATO only

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9D101 "Software" specially designed for the "use" of goods controlled by 9B105, 9B106, 9B116 or 9B117.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9D102 "Software" specially designed for the "use" of items controlled by 9A101, 9A106, 9A110, and 9A120.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: ''Software'' for items controlled by 9A115 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9D103 "Software" specially designed for modelling, simulation or design integration of "missiles", or the subsystems controlled by 9A005, 9A007, 9A105.a, 9A106, 9A108, 9A116 or 9A119. (This entry is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

9D990 "Software", n.e.s., for the "development" or "production" of equipment controlled by 9A990 or 9B990.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to ''software'' for equipment under 9A990 except 9A990.a.	AT Column 1
AT applies to ''software'' for equipment under 9A990.a only.	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

9D991 "Software", for the "development" or "production" of equipment controlled by 9A991 or 9B991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading

E. TECHNOLOGY

NOTE: ''Development'' or ''production'' ''technology'' controlled by 9E001 to 9E003 for gas turbine engines remains controlled when used as ''use'' ''technology'' for repair, rebuild and overhaul. Excluded from control are: technical data, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules.

9E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" controlled by 9A001.c, 9A004 to 9A011, 9B (except 9B990 or 9B991), or 9D (except 9D990 or 9D991).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 9A001.c, 9B001 to 9B009, 9D001 to 9D004.	NS Column 1
MT applies to ''technology'' for items controlled by 9B001, 9B002, 9B003, 9B004 9B005, 9B007, 9B105, 9B106, 9B116, 9B117, 9D001, 9D002, 9D003, and 9D004 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) See also 9E101 and 1E002.f (for controls on ''technology'' for the repair of controlled structures, laminates or materials). (2) The ''technology'' required for the ''development'' of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (3) ''Technology'', required for the ''development'' of equipment or ''software'' subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls, is also subject to the same licensing jurisdiction. (See 22 CFR part 121)

Related Definitions: ''Development'' or ''production'' ''technology'' controlled by 9E for gas turbine engines remains controlled when used as ''use'' ''technology'' for repair, rebuild and overhaul. Excluded from control are: technology, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules

Items: The list of items controlled is contained in the ECCN heading

9E002 "Technology" according to the General Technology Note for the "production" of equipment controlled by 9A001.c, 9A004 to 9A011 or 9B (except 9B990 or 9B991).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''technology'' for equipment controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B105, 9B106, 9B116, and 9B117 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) See also 9E102. (2) The ''technology'' required for the ''development'' of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (3) ''Technology'', required for the ''development'' of equipment or ''software'' subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls, is also subject to the same licensing jurisdiction. (See 22 CFR part 121)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

9E003 Other "technology", as follows (see List of Items Controlled).

LICENSE REQUIREMENTS

Reason for Control: NS, SI, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
SI applies to 9E003.a.1 through a.12 and f. See §742.14 of the EAR for additional information.	
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) Hot section ''technology'' specifically designed, modified, or equipped for military uses or purposes, or developed principally with U.S. Department of Defense funding, is subject to the licensing authority of the U.S. Department of State. (2) ''Technology'' is subject to the EAR when actually applied to a commercial aircraft engine program. Exporters may seek to establish commercial application either on a case-by-case basis through

submission of documentation demonstrating application to a commercial program in requesting an export license from the Department Commerce in respect to a specific export, or in the case of use for broad categories of aircraft, engines, or components, a commodity jurisdiction determination from the Department of State.

Related Definitions: N/A

Items: a. ''Technology'' ''required'' for the ''development'', ''production'', or overhaul of the following commercial aircraft engines, components or systems:

a.1. Gas turbine blades, vanes or tip shrouds made from directionally solidified (DS) or single crystal (SC) alloys having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000° C) at a stress of 200 MPa, based on the average property values;

a.2. Multiple domed combustors operating at average burner outlet temperatures exceeding 1,643 K (1,370° C) or combustors incorporating thermally decoupled combustion liners, non-metallic liners or non-metallic shells;

a.3. Components manufactured from organic ''composite'' materials designed to operate above 588 K (315° C), or from metal ''matrix'' ''composite'', ceramic ''matrix'', intermetallic or intermetallic reinforced materials controlled by 1A002 or 1C007;

a.4. Uncooled turbine blades, vanes, tipshrouds or other components designed to operate at gas path temperatures of 1,323 K (1,050° C) or more;

a.5. Cooled turbine blades, vanes or tipshrouds, other than those described in 9E003.a.1, exposed to gas path temperatures of 1,643 K (1,370°C) or more;

a.6. Airfoil-to-disk blade combinations using solid state joining;

a.7. Gas turbine engine components using ''diffusion bonding'' ''technology'' controlled by 2E003.b;

a.8. Damage tolerant gas turbine engine rotating components using powder metallurgy materials controlled by 1C002.b;

a.9. Full authority digital electronic engine control (FADEC) for gas turbine and combined cycle engines and their related diagnostic components, sensors and specially designed components;

a.10. Adjustable flow path geometry and associated control systems for:

a.10.a. Gas generator turbines;

a.10.b. Fan or power turbines;

a.10.c. Propelling nozzles;

NOTES: 1. Adjustable flow path geometry and associated control systems do not include inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.

2. 9E003.a.10 does not control ''development'' or ''production'' ''technology'' for adjustable flow path geometry for reverse thrust.

a.11. Rotor blade tip clearance control systems employing active compensating casing ''technology'' limited to a design and development data base; or

a.12 Gas bearing for gas turbine engine rotor assemblies;

a.13. Wide chord hollow fan blades without part-span support;

b. ''Technology'' ''required'' for the ''development'' or ''production'' of any of the following:

b.1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; or

b.2. ''Composite'' propeller blades or propfans capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;

c. ''Technology'' ''required'' for the ''development'' or ''production'' of gas turbine engine components using ''laser'', water jet, ECM or EDM hole drilling processes to produce holes having any of the following sets of characteristics:

c.1. All of the following:

c.1.a. Depths more than four times their diameter;

c.1.b. Diameters less than 0.76 mm; and

c.1.c. Incidence angles equal to or less than 25°; or

c.2. All of the following:

c.2.a. Depths more than five times their diameter;

c.2.b. Diameters less than 0.4 mm; and

c.2.c. Incidence angles of more than 25°;

TECHNICAL NOTE: For the purposes of 9E003.c, incidence angle is measured from a plane tangential to the airfoil surface at the point where the hole axis enters the airfoil surface.

d. ''Technology'' ''required'' for the ''development'' or ''production'' of helicopter power transfer systems or tilt rotor or tilt wing ''aircraft'' power transfer systems:

d.1. Capable of loss-of-lubrication operation for 30 minutes or more; or

d.2. Having an input power-to-weight ratio equal to or more than 8.87 kW/kg;

e.1. ''Technology'' for the ''development'' or ''production'' of reciprocating diesel engine ground vehicle propulsion systems having all of the following:

e.1.a. A box volume of 1.2 m^3 or less;

e.1.b. An overall power output of more than 750 kW based on 80/1269/EEC, ISO 2534 or national equivalents; and

e.1.c. A power density of more than 700 kW/m^3 of box volume;

TECHNICAL NOTE: Box volume: the product of three perpendicular dimensions measured in the following way:

Length: The length of the crankshaft from front flange to flywheel face;

Width: The widest of the following:

a. The outside dimension from valve cover to valve cover;

b. The dimensions of the outside edges of the cylinder heads; or

c. The diameter of the flywheel housing;

Height: The largest of the following:

a. The dimension of the crankshaft centerline to the top plane of the valve cover (or cylinder head) plus twice the stroke; or

b. The diameter of the flywheel housing.

e.2. ''Technology'' ''required'' for the ''production'' of specially designed components, as follows, for high output diesel engines:

e.2.a. ''Technology'' ''required'' for the ''production'' of engine systems having all of the following components employing ceramics materials controlled by 1C007:

e.2.a.1. Cylinder liners;

e.2.a.2. Pistons;

e.2.a.3. Cylinder heads; and

e.2.a.4. One or more other components (including exhaust ports, turbochargers, valve guides, valve assemblies or insulated fuel injectors);

e.2.b. ''Technology'' ''required'' for the ''production'' of turbocharger systems, with single-stage compressors having all of the following:

e.2.b.1. Operating at pressure ratios of 4:1 or higher;

e.2.b.2. A mass flow in the range from 30 to 130 kg per minute; and

e.2.b.3. Variable flow area capability within the compressor or turbine sections;

e.2.c. ''Technology'' ''required'' for the ''production'' of fuel injection systems with a specially designed multifuel (e.g., diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8°C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8°C)), having both of the following:

e.2.c.1. Injection amount in excess of 230 mm^3 per injection per cylinder; and

e.2.c.2. Specially designed electronic control features for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;

e.3. ''Technology'' ''required'' for the ''development'' or ''production'' of high output diesel engines for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication, permitting operation to temperatures exceeding 723 K (450°C), measured on the cylinder wall at the top limit of travel of the top ring of the piston.

f. ''Technology'' not otherwise controlled in 9E003.a.1 through a.12 and currently used in the ''development'', ''production'', or overhaul of hot section parts and components of civil derivatives of military engines controlled on the U.S. Munitions List.

9E018 "Technology" for the "development", "production", or "use" of equipment controlled by 9A018.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1.
RS applies to 9A018.a and .b	RS Column 2.
AT applies to entire entry	AT Column 1.
UN applies to entire entry	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes for Australia, Japan, New Zealand, and NATO only

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

9E101 "Technology" according to the General Technology Note for the "development" or "production" of goods controlled by 9A101, 9A104 to 9A111 or 9A115 to 9A120.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: ''Technology'' controlled by 9E101 for items in 9A101.b, 9A104, 9A105, to 9A109, 9A110 that are specially designed for use in missile systems and subsystems, 9A111, 9A115, and 9A116 to 9A120 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

9E102 "Technology" according to the General Technology Note for the "use" of goods controlled by 9A004 to 9A011, 9A101, 9A104 to 9A111, 9A115 to 9A120, 9B105, 9B106, 9B115, 9B116, 9B117, 9D101 or 9D103.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) For the purpose of this entry, ''use'' ''technology'' is limited to items controlled for MT reasons. (2) ''Technology'' controlled by 9E102 for items subject to the export licensing jurisdiction of the Department of State in 9A004 to 9A011, 9A101.b, 9A104 to 9A109, 9A110 that are specially designed for use in missile systems and subsystems, 9A111, 9A115, 9A116 to 9A120, and 9D103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

9E990 "Technology", n.e.s., for the "development" or "production" or "use" of equipment controlled by 9A990 or 9B990.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to ''technology'' for equipment under 9A990 and 9B990 except 9A990.a.	AT Column 1
AT applies to ''technology'' for equipment under 9A990.a only.	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

9E991 "Technology", for the "development", "production" or "use" of equipment controlled by 9A991 or 9B991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

[63 FR 2459, Jan. 15, 1998, as amended at 63 FR 14030, Mar. 24, 1998; 63 FR 37769, July 14, 1998; 63 FR 50527, Sept. 22, 1998; 63 FR 71581, Dec. 29, 1998; 63 FR 72167, Dec. 31, 1998]

SUPPLEMENT NO. 2 TO PART 774—GENERAL TECHNOLOGY AND SOFTWARE NOTES

1. *General Technology Note.* The export of ''technology'' that is ''required'' for the ''development'', ''production'', or ''use'' of items on the Commerce Control List is controlled according to the provisions in each Category.

''Technology'' ''required'' for the ''development'', ''production'', or ''use'' of a controlled product remains controlled even when applicable to a product controlled at a lower level.

License Exception OTS is available for ''technology'' that is the minimum necessary for the installation, operation, maintenance (checking), and repair of those products that are eligible for License Exceptions or that are exported under a license.

N.B.: This does not allow release under a License Exception of the repair ''technology'' controlled by 1E002.e, 1E002.f, 7E003, or 8E002.a.

N.B.: The *minimum necessary* excludes ''development'' or ''production'' technology and permits ''use'' technology only to the extent ''required'' to ensure safe and efficient use of the product. Individual ECCNs may further restrict export of ''minimum necessary'' information.

II. *General Software Note.* License Exception TSU (''mass market'' software) is available to all destinations, except Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria, for release of software that is generally available to the public by being:

a. Sold from stock at retail selling points, without restriction, by means of:

1. Over the counter transactions;

2. Mail order transactions; or

3. Telephone call transactions; and

b. Designed for installation by the user without further substantial support by the supplier.

NOTE: License Exception TSU for mass market software does not apply to encryption software controlled for EI reasons under ECCN 5D002. Encryption software may become eligible after a one-time BXA review according to the provision of §742.15(b)(1) of the EAR.

[61 FR 12937, Mar. 25, 1996, as amended at 61 FR 65467, Dec. 13, 1996; 61 FR 68587, Dec. 30, 1996]

SUPPLEMENT NO. 3 TO PART 774

CROSS-REFERENCE

Old ECCN	New ECCN
Sorted by "OLD" ECCN CAT 0	
0A18	0A018
0A80	0A980
0A82	0A982
0A82	0A983
0A84	0A984
0A84	0A985
0A86	0A986
0A88	0A988
0A95	§ 746.4(b)(2)(i)
0A96	EAR99
0A98	§ 734.3(b)(2)
0E18	0E018
0E84	0E984
0E96	EAR99
1B16	0B003
1C19.b	0C006
1D01	0D001
1E19	0E001
2A19.c	0B001
2A50.b	0B008
2D19	0D001
2D50	0D001
2E19	0E001
2E50	0E001
CAT 1	
***	1D103
***	1E202
***	1E203
1A01	1A001
1A02	1A002
1A03	1A003
1A22.b	1A102
1A27	1C116
1A45	1A226
1A46	1C202
1A47	1C216
1A48	1A290
1A50	1C226
1A84	1A984
1A88	1A988
1A96	EAR99
1B01	1B001
1B02	1B002
1B03	1B003
1B17	1B225
1B18	1B018
1B21	1B101
1B28	1B115
1B30.a	1B116
1B41	1B201
1B42	1B226
1B52	1B229
1B53	1B228
1B54	1B227
1B55	1B232
1B58	1B231
1B59	1B230
1B96	EAR99
1C01	1C001
1C02	1C002
1C03	1C003
1C05	1C005
1C06	1C006
1C07	1C007
1C08	1C008
1C09	1C009
1C10	1C010
1C18	1C018
1C19.a	1C234
1C19.c	1C233
1C19.d	1C230
1C19.e	1A225
1C19.f	1C231
1C21	1C101
1C22	1C117
1C27	1C107
1C31	1C115
1C49	1A225
1C50	1C210
1C50.c	1A202
1C51	1C229
1C52	1C227
1C53	1C228
1C54	1C236
1C55	1C232
1C56	1C238
1C57	1C225
1C58	1C237
1C60	1C350
1C61.a (partial), .b.c (partial), .f	1C351
1C61.a (partial), .c (partial)	1C352
1C61.c.15,c.16, .d	1C354
1C61.e	1C353
1C80	1C980
1C81	1C981
1C82	1C982
1C83	1C983
1C84	1C984
1C88	1C988
1C91	1C991
1C92	1C992
1C93	1C993
1C94	1C994
1C95	1C995
1C96	EAR99
1CO4	1C004
1D01	1D018
1D01	1D001
1D02	1D002
1D23	1D101
1D41	1D201
1D60	1D390
1D93	1D993
1D94	1D993
1D96	EAR99
1E02	1E002
1E23	1E001
1E23	1E101
1E24	1E103
1E25	1E104
1E40	1E201
1E41	1E201
1E60	1E001
1E60	1E350
1E60	1E391
1E61	1E001
1E61	1E351
1E61	1E391
1E94	1E994
1E96	EAR99
2A50.c	1A227
CAT 2	
***	2A993
***	2B207
1A44	2A225
1B30.b	2B104

Old ECCN	New ECCN
1B50.a	2B226
1B50.b	2B227
1B51	2B230
1B70.a through .d	2B350
1B70.e	2B351
1B71	2B352
1D50	2D201
1E41	2E201
1E70	2E301
2A01	2A001
2A02	2A002
2A03	2A003
2A04	2A004
2A05	2A005
2A06	2A006
2A48	2A226
2A49	2A290
2A50.b.d.f	2A291
2A50.e	2B225
2A51	2A292
2A52	2B231
2A53	2A293
2A94	2A994
2A96	EAR96
2B01	2B001
2B02	2B002
2B03	2B003
2B04	2B004
2B05	2B005
2B06	2B006
2B07	2B007
2B08	2B008
2B09	2B009
2B18	2B018
2B24	2B104
2B41	2B290
2B44	2B204
2B50	2B115
2B50	2B215
2B51	2B228
2B53	2B229
2B85	2B985
2B91	2B991
2B92	2B992
2B93	2B993
2B94	2B994
2B96	EAR99
2D01	2D001
2D02	2D002
2D18	2D018
2D24	2D101
2D41	2D290
2D49	2D290
2D50	2D290
2D92	2D994
2D93	2D992
2D94	2D993
2D96	EAR99
2E01	2E001
2E02	2E002
2E03	2E003
2E18	2E018
2E20	2E201
2E24	2E001
2E24	2E002
2E24	2E101
2E40	2E201
2E40	2E290
2E41	2E001
2E41	2E002
2E41	2E201
2E41	2E290
2E44	2E001
2E44	2E002
2E44	2E201
2E44	2E290
2E48	2E001
2E48	2E002
2E48	2E201
2E49	2E001
2E49	2E002
2E49	2E290
2E50	2E001
2E50	2E002
2E50	2E201
2E50	2E290
2E51	2E001
2E51	2E002
2E51	2E201
2E51	2E290
2E52	2E001
2E52	2E002
2E52	2E201
2E53	2E001
2E53	2E002
2E53	2E201
2E53	2E290
2E93	2E994
2E94	2E993
2E96	EAR99
3A48	2B232
9B26.a	2B116

CAT 3

2A19.b	3A231
3A01	3A001
3A02	3A002
3A22	3A101
3A41	3A201.a
3A42	3A201.b
3A43	3A228
3A44	3A230
3A46	3A229
3A49	3A232
3A50	3A225
3A51	3A233
3A52	3A202
3A53	3A227
3A54	3A226
3A55	3A201.c
3A80	3A980
3A81	3A981
3A92	3A992
3A93	3A993
3A94	3A994
3A96	EAR99
3B01.a	3B001
3B01.b	3B002
3B01.c	3B003
3B01.d	3B004
3B01.e	3B005
3B01.f	3B006
3B01.g	3B007
3B01.h	3B008
3B91	3B991
3B96	EAR99
3C01	3C001
3C02	3C002
3C03	3C003
3C04	3C004
3C96	EAR99
3D02	3D002
3D03	3D003
3D21	3D001
3D22	3D001
3D22	3D101
3D80	3D980

Old ECCN	New ECCN
3D94	3D994
3D96	EAR99
3E02	3E002
3E22	3E001
3E22	3E101
3E40	3E001
3E40	3E201
3E41	3E201
3E80	3E980
3E94	3E994
3E96	EAR99

CAT 4

4A01	4A001
4A02	4A002
4A03	4A003
4A04	4A004
4A21	4A101
4A80	4A980
4A94	4A994
4A96	EAR99
4B94	4B994
4B96	EAR99
4C94	4C994
4C96	EAR99
4D01	4D001
4D02	4D002
4D03	4D003
4D21	4D190
4D80	4D980
4D92	4D994
4D93	4D993
4D94	4D994
4D96	EAR99
4E01	4E001
4E02	4E002
4E80	4E980
4E92	4E994
4E93	4E993
4E94	4E994
4E96	EAR99

CAT 5

2A19.a	Deleted
5A01	5A001.a
5A02	5A001.b
5A03	5A001.c
5A04	5A001.d
5A05	5A001.e
5A06	5A001.f
5A11	5A002
5A20	5A101
5A80	5A980
5A90	5A990
5A91	5A991
5A92	5A992
5A93	5A993
5A94	5A994
5A95	5A995
5A96	EAR99
5B01	5B001.a
5B02	5B001.b
5B11	5B002.a.1
5B12	5B002.a.2
5B13	5B002.b
5B94	5B994
5B96	EAR99
5C01	5C001
5C96	EAR99
5D01	5D001.a
5D02	5D001.b
5D03	5D001.c
5D11	5D002.a
5D12	5D002.b
5D13	5D002.c
5D20	5D101
5D20	5D190
5D90	5D990
5D91	5D991
5D92	5D992
5D93	5D993
5D94	5D994
5D95	5D995
5D96	EAR99
5E01	5E001.a
5E02	5E001.b
5E11	5E002
5E20	5E101
5E90	5E990
5E91	5E991
5E92	5E992
5E93	5E993
5E94	5E994
5E95	5E995
5E96	EAR99

CAT 6

2A44.a	6A225
2A44.b.c	6A226
6A01	6A001
6A02	6A002
6A03	6A003
6A04	6A004
6A05	6A005
6A06	6A006
6A07	6A007
6A07	6A107
6A08	6A008
6A18	6A018
6A22	6A102
6A28	6A108
6A29	6A108
6A30	6B108
6A43	6A203
6A44	6A202
6A50	6A205
6A90	6A990
6A92	6A992
6A93	6A993
6A94	6A994
6A96	EAR99
6B04	6B004
6B05	6B005
6B07	6B007
6B08	6B008
6B96	EAR99
6C02	6C002
6C04	6C004
6C05	6C005
6C96	EAR99
6D01	6D001
6D02	6D002
6D03	6D003
6D21	6D001
6D22	6D102
6D29	6D103
6D90	6D990
6D92	6D990
6D93	6D990
6D94	6D994
6D96	EAR99
6E01	6E001
6E02	6E002
6E03	6E003

Old ECCN	New ECCN
6E21	6E001
6E22	6E002
6E23	6E101
6E40	6E201
6E41	6E001
6E41	6E002
6E41	6E201
6E94	6E994
6E96	EAR99

CAT 7

* * *	7D102
7A01	7A001
7A02	7A002
7A03	7A003
7A04	7A004
7A06	7A006
7A21	7A101
7A22	7A102
7A23	7A103
7A24	7A104
7A26	7A106
7A27	7A115
7A94	7A994
7B01	7B001
7B02	7B002
7B03	7B003
7B22.a	7B102
7B22.b through .f	7B101
7B94	7B994
7D01	7D001
7D02	7D002
7D03	7D003
7D24	7D001
7D24	7D101
7D94	7D994
7E01	7E001
7E02	7E002
7E03	7E003
7E04	7E004
7E21	7E001
7E21	7E002
7E21	7E101
7E22	7E102
7E94	7E994

CAT 8

8A01	8A001
8A02	8A002
8A18	8A018
8A92	8A992
8A93	8A993
8A94	8A994
8A96	EAR99
8B01	8B001
8B96	EAR99
8C01	8C001
8C96	EAR99
8D01	8D001
8D02	8D002
8D92	8D992
8D93	8D993
8D96	EAR99
8E01	8E001
8E02	8E002
8E92	8E992
8E93	8E993
8E96	EAR99

CAT 9

1A22.a	9A110
9A01	9A001
9A02	9A002
9A03	9A003
9A04	9A004
9A18	9A018
9A21	9A101
9A22	9A115
9A23	9A106
9A24	9A190
9A80	9A980
9A90	9A990
9A91	9A991
9A92	9A992
9A93	9A993
9A94	9A994
9A96	EAR99
9B01	9B001
9B02	9B002
9B03	9B003
9B04	9B004
9B05	9B005
9B06	9B006
9B07	9B007
9B08	9B008
9B09	9B009
9B21	9B115
9B21	9B116
9B25	9B105
9B26.b	9B106
9B27	9B117
9B94	9B994
9B96	EAR99
9D01	9D001
9D02	9D002
9D03	9D003
9D04	9D004
9D18	9D018
9D24	9D001
9D24	9D002
9D24	9D101
9D90	9D990
9D91	9D991
9D93	9D993
9D94	9D994
9D96	EAR99
9E01	9E001
9E02	9E002
9E03	9E003
9E18	9E018
9E21	9E101
9E21	9E102
9E90	9E990
9E91	9E991
9E93	9E993
9E94	9E994
9E96	EAR99

Sorted by ''NEW'' ECCN
CAT 0

0A18	0A018
0A80	0A980
0A82	0A982
0A82	0A983
0A84	0A984
0A84	0A985
0A86	0A986
0A88	0A988
2A19.c	0B001
1B16	0B003
2A50.b	0B008
1C19.b	0C006
1D01	0D001
2D19	0D001

Old ECCN	New ECCN
2D50	0D001
1E19	0E001
2E19	0E001
2E50	0E001
0E18	0E018
0E84	0E984
0A98	§ 734.3(b)(2)
0A95	§ 746.4(b)(2)(i)
0A96	EAR99
0E96	EAR99

CAT 1

1A01	1A001
1A02	1A002
1A03	1A003
1A22.b	1A102
1C50.c	1A202
1C19.e	1A225
1C49	1A225
1A45	1A226
2A50.c	1A227
1A48	1A290
1A84	1A984
1A88	1A988
1B01	1B001
1B02	1B002
1B03	1B003
1B18	1B018
1B21	1B101
1B28	1B115
1B30.a	1B116
1B41	1B201
1B17	1B225
1B42	1B226
1B54	1B227
1B53	1B228
1B52	1B229
1B59	1B230
1B58	1B231
1B55	1B232
1C01	1C001
1C02	1C002
1C03	1C003
1CO4	1C004
1C05	1C005
1C06	1C006
1C07	1C007
1C08	1C008
1C09	1C009
1C10	1C010
1C18	1C018
1C21	1C101
1C27	1C107
1C31	1C115
1A27	1C116
1C22	1C117
1A46	1C202
1C50	1C210
1A47	1C216
1C57	1C225
1A50	1C226
1C52	1C227
1C53	1C228
1C51	1C229
1C19.d	1C230
1C19.f	1C231
1C55	1C232
1C19.c	1C233
1C19.a	1C234
1C54	1C236
1C58	1C237
1C56	1C238
1C60	1C350
1C61.a (partial), .b.c (partial), .f	1C351
1C61.a (partial), .c (partial)	1C352
1C61.e	1C353
1C61.c.15, c.16, .d	1C354
1C80	1C980
1C81	1C981
1C82	1C982
1C83	1C983
1C84	1C984
1C88	1C988
1C91	1C991
1C92	1C992
1C93	1C993
1C94	1C994
1C95	1C995
1D01	1D001
1D02	1D002
1D01	1D018
1D23	1D101
* * *	1D103
1D41	1D201
1D60	1D390
1D93	1D993
1D94	1D993
1E23	1E001
1E60	1E001
1E61	1E001
1E02	1E002
1E23	1E101
1E24	1E103
1E25	1E104
1E40	1E201
1E41	1E201
* * *	1E202
* * *	1E203
1E60	1E350
1E61	1E351
1E60	1E391
1E61	1E391
1E94	1E994
1A96	EAR99
1B96	EAR99
1C96	EAR99
1D96	EAR99
1E96	EAR99

CAT 2

2A01	2A001
2A02	2A002
2A03	2A003
2A04	2A004
2A05	2A005
2A06	2A006
1A44	2A225
2A48	2A226
2A49	2A290
2A50.b.d.f	2A291
2A51	2A292
2A53	2A293
* * *	2A993
2A94	2A994
2B01	2B001
2B02	2B002
2B03	2B003
2B04	2B004
2B05	2B005
2B06	2B006
2B07	2B007
2B08	2B008
2B09	2B009
2B18	2B018
1B30.b	2B104
2B24	2B104

Old ECCN	New ECCN
2B50	2B115
9B26.a	2B116
2B44	2B204
* * *	2B207
2B50	2B215
2A50.e	2B225
1B50.a	2B226
1B50.b	2B227
2B51	2B228
2B53	2B229
1B51	2B230
2A52	2B231
3A48	2B232
2B41	2B290
1B70.a through .d	2B350
1B70.e	2B351
1B71	2B352
2B85	2B985
2B91	2B991
2B92	2B992
2B93	2B993
2B94	2B994
2D01	2D001
2D02	2D002
2D18	2D018
2D24	2D101
1D50	2D201
2D41	2D290
2D49	2D290
2D50	2D290
2D93	2D992
2D94	2D993
2D92	2D994
2E01	2E001
2E24	2E001
2E41	2E001
2E44	2E001
2E48	2E001
2E49	2E001
2E50	2E001
2E51	2E001
2E52	2E001
2E53	2E001
2E02	2E002
2E24	2E002
2E41	2E002
2E44	2E002
2E48	2E002
2E49	2E002
2E50	2E002
2E51	2E002
2E52	2E002
2E53	2E002
2E03	2E003
2E18	2E018
2E24	2E101
1E41	2E201
2E20	2E201
2E40	2E201
2E41	2E201
2E44	2E201
2E48	2E201
2E50	2E201
2E51	2E201
2E52	2E201
2E53	2E201
2E40	2E290
2E41	2E290
2E44	2E290
2E49	2E290
2E50	2E290
2E51	2E290
2E53	2E290
1E70	2E301
2E94	2E993
2E93	2E994
2A96	EAR96
2B96	EAR99
2D96	EAR99
2E96	EAR99

CAT 3

3A01	3A001
3A02	3A002
3A22	3A101
3A41	3A201.a
3A42	3A201.b
3A55	3A201.c
3A52	3A202
3A50	3A225
3A54	3A226
3A53	3A227
3A43	3A228
3A46	3A229
3A44	3A230
2A19.b	3A231
3A49	3A232
3A51	3A233
3A80	3A980
3A81	3A981
3A92	3A992
3A93	3A993
3A94	3A994
3B01.a	3B001
3B01.b	3B002
3B01.c	3B003
3B01.d	3B004
3B01.e	3B005
3B01.f	3B006
3B01.g	3B007
3B01.h	3B008
3B91	3B991
3C01	3C001
3C02	3C002
3C03	3C003
3C04	3C004
3D21	3D001
3D22	3D001
3D02	3D002
3D03	3D003
3D22	3D101
3D80	3D980
3D94	3D994
3E22	3E001
3E40	3E001
3E02	3E002
3E22	3E101
3E40	3E201
3E41	3E201
3E80	3E980
3E94	3E994
3A96	EAR99
3B96	EAR99
3C96	EAR99
3D96	EAR99
3E96	EAR99

CAT 4

4A01	4A001
4A02	4A002
4A03	4A003
4A04	4A004
4A21	4A101
4A80	4A980
4A94	4A994

Old ECCN	New ECCN
4B94	4B994
4C94	4C994
4D01	4D001
4D02	4D002
4D03	4D003
4D21	4D190
4D80	4D980
4D93	4D993
4D92	4D994
4D94	4D994
4E01	4E001
4E02	4E002
4E80	4E980
4E93	4E993
4E92	4E994
4E94	4E994
4A96	EAR99
4B96	EAR99
4C96	EAR99
4D96	EAR99
4E96	EAR99
CAT 5	
5A01	5A001.a
5A02	5A001.b
5A03	5A001.c
5A04	5A001.d
5A05	5A001.e
5A06	5A001.f
5A11	5A002
5A20	5A101
5A80	5A980
5A90	5A990
5A91	5A991
5A92	5A992
5A93	5A993
5A94	5A994
5A95	5A995
5B01	5B001.a
5B02	5B001.b
5B11	5B002.a.1
5B12	5B002.a.2
5B13	5B002.b
5B94	5B994
5C01	5C001
5D01	5D001.a
5D02	5D001.b
5D03	5D001.c
5D11	5D002.a
5D12	5D002.b
5D13	5D002.c
5D20	5D101
5D20	5D190
5D90	5D990
5D91	5D991
5D92	5D992
5D93	5D993
5D94	5D994
5D95	5D995
5E01	5E001.a
5E02	5E001.b
5E11	5E002
5E20	5E101
5E90	5E990
5E91	5E991
5E92	5E992
5E93	5E993
5E94	5E994
5E95	5E995
2A19.a	Deleted
5A96	EAR99
5B96	EAR99
5C96	EAR99
5D96	EAR99
5E96	EAR99
CAT 6	
6A01	6A001
6A02	6A002
6A03	6A003
6A04	6A004
6A05	6A005
6A06	6A006
6A07	6A007
6A08	6A008
6A18	6A018
6A22	6A102
6A07	6A107
6A28	6A108
6A29	6A108
6A44	6A202
6A43	6A203
6A50	6A205
2A44.a	6A225
2A44.b.c	6A226
6A90	6A990
6A92	6A992
6A93	6A993
6A94	6A994
6B04	6B004
6B05	6B005
6B07	6B007
6B08	6B008
6A30	6B108
6C02	6C002
6C04	6C004
6C05	6C005
6D01	6D001
6D21	6D001
6D02	6D002
6D03	6D003
6D22	6D102
6D29	6D103
6D90	6D990
6D92	6D990
6D93	6D990
6D94	6D994
6E01	6E001
6E21	6E001
6E41	6E001
6E02	6E002
6E22	6E002
6E41	6E002
6E03	6E003
6E23	6E101
6E40	6E201
6E41	6E201
6E94	6E994
6A96	EAR99
6B96	EAR99
6C96	EAR99
6D96	EAR99
6E96	EAR99
CAT 7	
7A01	7A001
7A02	7A002
7A03	7A003
7A04	7A004
7A06	7A006
7A21	7A101
7A22	7A102
7A23	7A103
7A24	7A104

Old ECCN	New ECCN
7A26	7A106
7A27	7A115
7A94	7A994
7B01	7B001
7B02	7B002
7B03	7B003
7B22.b through .f	7B101
7B22.a	7B102
7B94	7B994
7D01	7D001
7D24	7D001
7D02	7D002
7D03	7D003
7D24	7D101
***	7D102
7D94	7D994
7E01	7E001
7E21	7E001
7E02	7E002
7E21	7E002
7E03	7E003
7E04	7E004
7E21	7E101
7E22	7E102
7E94	7E994

CAT 8

8A01	8A001
8A02	8A002
8A18	8A018
8A92	8A992
8A93	8A993
8A94	8A994
8B01	8B001
8C01	8C001
8D01	8D001
8D02	8D002
8D92	8D992
8D93	8D993
8E01	8E001
8E02	8E002
8E92	8E992
8E93	8E993
8A96	EAR99
8B96	EAR99
8C96	EAR99
8D96	EAR99
8E96	EAR99

CAT 9

9A01	9A001
9A02	9A002
9A03	9A003
9A04	9A004
9A18	9A018
9A21	9A101
9A23	9A106
1A22.a	9A110
9A22	9A115
9A24	9A190
9A80	9A980
9A90	9A990
9A91	9A991
9A92	9A992
9A93	9A993
9A94	9A994
9B01	9B001
9B02	9B002
9B03	9B003
9B04	9B004
9B05	9B005
9B06	9B006
9B07	9B007
9B08	9B008
9B09	9B009
9B25	9B105
9B26.b	9B106
9B21	9B115
9B21	9B116
9B27	9B117
9B94	9B994
9D01	9D001
9D24	9D001
9D02	9D002
9D24	9D002
9D03	9D003
9D04	9D004
9D18	9D018
9D24	9D101
9D90	9D990
9D91	9D991
9D93	9D993
9D94	9D994
9E01	9E001
9E02	9E002
9E03	9E003
9E18	9E018
9E21	9E101
9E21	9E102
9E90	9E990
9E91	9E991
9E93	9E993
9E94	9E994
9A96	EAR99
9B96	EAR99
9D96	EAR99
9E96	EAR99

Parts 775–799 [Reserved]